SCALOGRAM ANALYSIS AS A MEASURE OF DIETARY DIFFERENTIATION IN RELATION TO SELECTED SOCIODEMOGRAPHIC AND HEALTH INDICATORS AMONG FOUR ETHNIC GROUPS RESIDING IN JERUSALEM, ISRAEL

by

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(ABSTRACT)

A study was conducted to explore the usefulness of scalogram analysis of 24-hour recall dietary data as a measure of dietary complexity in relationship to other measures of social stratification, status incongruity and selected stress related health indicators in a population of Jerusalem adolescents and a sub-sample of their parents.

Data used in the study were collected as part of the Jerusalem Lipid Research Clinics Prevalence Study. The study sample consisted of 2,160 adults and seventeen year olds. Twenty four hour dietary recall data were transformed into a series of food group variables based on use of any, or non use of all, food item(s) in the group. Using a Guttman scale procedure with adjustment for misclassification, separate quasi scales were generated for each of the four major ethnic groups in the study sample. Ethnicity was determined by the country of birth for adults and country of father's birth for adolescents. Each scale contained five food groups.

Guttman scale scores and a dichotomous complexity score based on the Guttman scale scores were then compared with selected social stratification, nutritional, behavioral and health status variables.

Univariate analyses of scale ranks with other variables showed a significant negative association with age and positive association with education of father. Spouse status inconsistency was marginally positively associated with dietary complexity. Spouse scale scores were significantly correlated for homogeneous (same origin) pairs but not for nonhomogeneous pairs. Fathers' complexity scores were associated with those of their children but mothers' scores were not. Nutrients associated with complexity were primarily fat, cholesterol and energy (positive), starch and carbohydrate (negative). Mean plasma cholesterol was higher in fathers in the high complexity group, compared to fathers in the low complexity group, but stress related health and behavioral variables did not appear to be related to dietary complexity as measured in this study. It was concluded that the Guttman procedure used with twenty-four hour recall data tends to scale one day dietary patterns rather than a dietary habit and only to the extent that the twenty-four hour intake represents habitual intake could it reliably scale people.

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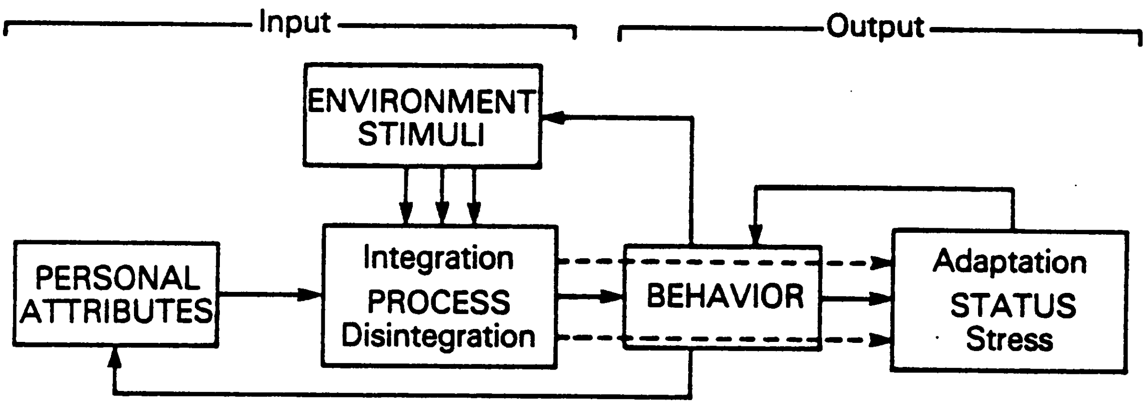
THE PROBLEM AND ITS SETTING

Statement of the Problem

The purpose of this study was to explore the usefulness of scalogram analysis of 24-hour recall dietary data as a measure of dietary complexity in relationship to other measures of social stratification, status incongruity and selected stress related health indicators in a population of Jerusalem adolescents and a sub-sample of their parents.

Theoretical Framework

The problem was viewed within an ecological system as depicted in Fig. 1, in which individuals receive stimuli from the environment, to which they must respond through various coping mechanisms in order to maintain a steady state. Human adaptation is mediated through a complex interaction of personal attributes with environmental stimuli. The quality of the adaptation process depends on selective acceptance of information and its interpretation. Changes in the environment introduce tension. Response to environmental stimuli will be in the direction of reducing tension in the system. As the complexity of the environment increases, so must the response if adaptation is to be effective. The more highly differentiated individuals will thus have a greater adaptive response potential, while those with more limited



I.Q.	Learning Capacity	Leisure Use	Body Mass
Sex	Experience	Smoking	Blood Pressure
Age	Values	Food Consumption	Disease Symptoms
Education	Expectations	Alcohol Use	
Occupation	Attitudes	Purchases	
Nationality	Innovation	Work	
Race	Power		
Family Membership	Personality		
Group Membership	Motivation		
Information Sources			
Income			
Marital Status			
Genetic Traits			
Residence			

NOTE: Underlined variables were measured in the Jerusalem LRC Prevalence Study.

Fig. 1 General Model

capabilities and competing or conflicting priorities will have many more constraints on the choices available to them, and consequently a greater risk for maladaptive behavior. It is proposed that health is the outcome of adaptation while ill health is the expression of maladaptation, or failure to reduce stress effectively.

An examination of all the factors suggested in the model is not practical nor are the data available in the present study. The key issue is the extent to which differentiation in response to environmental stimuli is related to health outcome. Dietary complexity was chosen as a surrogate measure of differentiation because it represents a behavioral response to stimuli, the product of environmental and personal inputs, funneled through a process that is largely unmeasurable. Validation of the proposed surrogate measure (dietary differentiation) will be through evaluating its relationship to selected input variables. Validation of the model itself will require testing the associations of selected input variables with behavioral and status outcome variables.

The Jerusalem Jewish population was selected to test the model because it provides data on adolescents and their parents from several distinct origin groups that differ in sociocultural and dietary characteristics as well as disease patterns. This diversity will allow the investigator to evaluate the potential universality of the relationships uncovered in the analysis. Furthermore the immigration or "aliya" experience of large segments of the population is a potentially stressful situation and may thus provide insights into coping behavior as manifest through differentiation.

Sub problems

The first sub problem was to construct a Guttman Scale from 24-hour recall dietary data for each major origin group: Israeli, Europe-American, Asian and North African.

The second sub problem was to compare the sociodemographic characteristics in the scale strata for each origin group.

The third sub problem was to develop a status incongruity score for each parent participant and to examine the effect of status consistency on scale scores.

The fourth sub problem was to compare parent-spouse scale scores and parent-child scale scores.

The fifth sub problem was to compare mean nutrient intakes in the scale strata for each origin group.

The sixth sub problem was to compare scale score with alcohol and smoking histories, body mass index and blood pressure.

In addition to descriptive analyses described in the delineation of the sub-problems, the following hypotheses were tested:

The Hypotheses

1. Dietary complexity is positively related to differentiation in social class.

2. Dietary complexity is selectively related to different patterns of status incongruity.

3. Patterns of status incongruity that are associated with low dietary complexity are positively related to blood pressure.

4. Dietary complexity is positively related to body mass index in men and negatively related to body mass index in women.

5. Dietary complexity is negatively related to smoking behavior.

6. Dietary complexity is negatively related to blood pressure.

Delimitations of the Problem

The study did not attempt to address dietary adequacy beyond contributions of protein, fat, carbohydrate, alcohol, fatty acids and sugars to energy.

The study was limited to Jerusalem participants and data collected in the Lipid Research Clinics Prevalence Study (LRC). No additional data were collected.

Health indicators were limited to those measured in the LRC that have an imputed stress component and/or are associated with diet.

Definition of Terms

Acculturation: The total adaptive process that occurs in cultural patterning and value systems, group alignments, systems of control, social organization and economy and in the psychological structures and functions of individuals as adaptations are made to the changing conditions of existence created by the impact of populations and their cultures upon each other (1).

Adaptation: Alteration in the structure or functioning of individuals or groups which allows them to survive in a changed environment.

Coping: Any action taken by the individual or group to reduce the effect of some stressful circumstance.

Differentiation: The degree to which an individual or group is stratified in its ability to process increasingly complex information from the environment. Dietary complexity is used interchangeably with differentiation in this study.

Disease: The result of and reaction to, internal and/or external damage. Disease can be considered as a form of behavior of the organism, partly adaptive, partly defensive, to stress which has damaged, upset or threatens to damage or upset its homeostasis within its environment (2).

Status consistency: The degree to which an individual's rank positions on important societal status hierarchies are at a comparable level.

Stress: Any stimulus or stimuli experienced consciously or unconsciously which is potentially harmful or threatening to the individual.

The Importance of the Study

Response to stress is thought to be an important factor in susceptibility to disease; yet measurement of chronic stress patterns in free living populations is difficult. Traditional methods have involved indirect measurement of situational variables such as place of residence (urban vs rural), status incongruities and family background, thought to be stress provoking. These measures assume a uniform exposure to stress but they do not address the issue of coping behavior. Measurement of behavioral variables might better identify segments of the population at risk for stress related illness. Dietary data are often collected in epidemiological studies to evaluate nutrient intake. Using dietary data as a surrogate measure of coping behavior could provide a useful technique in studying the effects of stress on illness.

If one could differentiate the people who are stressed and who are not stressed by particular stressors, one would know who would need protection either by avoiding exposure or through some special treatment or education to avoid the ill-effects of exposure.

REVIEW OF RELATED LITERATURE

Guttman Scales

Scalogram analysis, or Guttman scaling, is a method of analyzing the underlying operating characteristics of a set of response items in order to determine if the interrelationships meet the criteria that define a Guttman scale (3). A Guttman scale must be unidimensional. Theoretically, the universe consists of all the attributes contained in a single dimension. If selected attributes are found to form a scale then it can be assumed that they represent a single dimension. Attributes or items that do not scale may be components of another dimension. A Guttman scale must also be cumulative. That is, the person ranking high on the scale possesses all the attributes of those ranking below, plus additional ones; or stated another way, possesses more of the quality being measured. Knowledge of a person's scale rank allows one to predict the attributes possessed or endorsed by that individual.

A Guttman scale classifies both individuals and items. In constructing a scale, items are ordered in columns and individuals in rows according to the number of positive responses. The resulting matrix forms a parallelogram in which the maximum positive responses are concentrated in the upper right portion and maximum negative responses in the lower left portion. Scale rank cut points are then assigned in a stepwise fashion. Negative responses in a positive field and positive responses in a negative field constitute errors. See example below.

Guttman Scale

respondents	items 5	4	3	2	1	score
A	+*	+	+	+*	+	5
B	+	+	+	0	+	4
C	0	0	+	+	+	3
D	0	0*	0	+	+	2
E	0	+	0	0	+	1
Errors*	1	1	0	1	0	
Percent positive responses	40	40	60	60	100	
Percent negative responses	60	60	40	40	0	

Evaluation: Evaluation of Guttman scales has vexed researchers for years. The standard statistic used is the coefficient of reproducibility (CR). This is defined as the ability of the scale to reproduce the items endorsed when the individual's scale step is known e.g., the probability of correctly predicting which items were endorsed. It is obtained by the formula

$$CR = 1 - A/B$$

in which

A = Placement errors

B = Total number of responses

In the example given above, the CR = 1-3/25 = .88

A minimum CR of .9 is considered acceptable. Scales with a higher error of reproducibility, called quasi scales, cannot reproduce a person's characteristics very well; however the rank order achieved in these quasi scales is perfectly efficient for relating any outside variable to the scale step (3).

Reproducibility however is not a sufficient test of scalability. A key issue in constructing a scale is to avoid a spuriously high CR. By selecting items with extreme response patterns, 10% or 90%, the researcher is virtually assured of achieving an acceptable CR. This problem was recognized by Guttman and others but no adequate statistical theory has been put forth to solve it. In order to avoid this pitfall, Stouffer, et al. have recommended that attempts be made to include in the item sample as wide a range of marginal distributions as possible, and specifically to attempt to include items with marginals around 50% (3). Others have set conventional limits for item marginals at 20% to 80% (4).

Another approach to solving the problem of spuriously high reproducibility is the coefficient of scalability (CS) suggested by Menzel (5). This coefficient, ranging from 0 to 1, is a measure of the seriousness of errors in the scale and allows one to speak meaningfully of degrees of scalability. The CS is defined as 1 - (CR-MMR)/1-MMR. Minimum marginal reproducibility (MMR) is calculated from item marginals (percent of the respondents who used or did not use each item) and is the mean of the modal responses to each item. In the example given above, the MMR=.68 and the CS=.38. The CS cannot be raised by combining items to produce extreme marginal values, because it imposes an exact mathematical penalty for the exact amount of new extremeness introduced. The acceptable value for scalability is somewhere between .6 and .65. This statistic has been criticized however, on the ground that it applies to reproducibility of the items rather than the scale (6).

TenHouten has proposed another statistical approach to the evaluation of scales which he calls scale gradient analysis (SGA) (6). SGA produces a statistic which measures the proportion of residual variation in a scale matrix explained by the assumption that a scalable variable underlies the items. Comparability between scales is thus attained and multivariate statistical hypotheses can be tested. Another advantage is that SGA provides an objective criterion for establishing the cutting points of all items in a scale. This is important where allowed responses are other than dichotomies. The general rule of thumb is that the jth most difficult item should have (2 j - 1)/2r subjects with positive responses (r = number of items).

Proctor has proposed a probability model to analyze response data (7,8). The model assumes that every subject belongs to some one Guttman true type and that deviant response patterns are errors. The computer program provides estimates of the underlying true types, misclassification parameters, and a chi square statistic to test the goodness of fit for the model. It also calculates the correlation between true types scores and response pattern scores, providing an index of Guttman scale reliability that can be compared with other estimates of item reliability.

<u>Item selection</u>: Since the universe is the concept whose scalability is being tested, it consists of all attributes that define the concept. Stouffer, et al., offer some guidelines for item selection (3). The more items included in a scale, the greater is the assurance that the entire universe, of which the items are a sample, is scalable. They suggest that ten or more items be used initially in a pretest to

determine whether or not a universe is scalable. If the universe is shown to be scalable fewer items may be used in the larger study to obtain the number of ranks necessary for the amount of discrimination between people required for the study. Similarly, the more response categories for items included in the scale, the greater is the assurance that the entire universe is scalable.

According to scalogram theory, if the universe consists of a single dimension, then the same rank order will be obtained regardless of which sample of items is selected from the universe. If the universe is scalable, the addition of further items merely breaks up each type given by the sample into more differentiated types but it would not interchange the rank order of individuals in the sample (3).

Clayton cautions that selection of scale items should be based on a theoretical sampling of the universe (4). When this is not done, the researcher may not tap all of the salient points along the dimension. The initial supply of items should be representative of the eventual population's definition of the dimension, and there should be some expert consensus involved in the final selection of items in the scale. Bias is introduced when the researcher dominates the selection process. In as much as possible, the selection of items should be empirically based.

These guidelines are directed primarily toward opinion and attitude scales since most of the theoretical and methodological investigation has been carried out by social scientists. There is relatively little guidance in the literature with respect to item selection in food habits research. If one can extrapolate from the social science literature, it would seem that there would have to be an ideological basis for grouping of foods into items. Usually food item grouping is done on the basis of nutrient content, although there is no empirical basis for assuming this grouping would have the same meaning cross culturally. For example, Chassy, et al. were unable to scale vegetables in their study which may have been related to differences in investigator and folk taxonomies (9). The choice of taxonomy will to a great extent, determine the information that is conveyed in the scale. It could be argued that, ideally, a population-based taxonomy be developed empirically before constructing food scale items.

Campbell, et al. have recently reported a study in which a number of food grouping schemes were compared with respect to their ability to predict nutritional risk (10). These authors were interested in diversity rather than complexity or differentiation, so the Guttman procedure was not included in the analysis. Of interest to the present study, however, was a population determined taxonomy based on a card sorting technique. The study sample consisted of 194 women ranging in age from 15 to 50 who were attending a family planning clinic in central New York State. The women were asked to sort the cards into "similar" piles or groups. No other instruction was given. Seventy eight percent of the sample grouped foods on the basis of meat, vegetable, fruit, dairy and cereal type categories. However, there was a smaller sub group of older, less educated women who grouped the foods in terms of the degree of liking or frequency of intake.

There is also little guidance in the literature on the theoretical implications of combining items in a scale on the basis of response pattern as opposed to the nutritional or other classifying characteristics. This type of manipulation may improve scalability but obscures interpretation of the scale.

Validation of Scales

The Guttman scale in itself does not define content. Achievement of a scale implies that a single dimension is measured but the identification of the dimension is established by the investigator *a priori*. Investigators have attempted to validate their scales by comparing ranks achieved by different methods. These studies are reported in subsequent sections.

Scalogram analysis of diet

In recent years there has been increased interest in using scalogram analysis in the study of food patterns and behavioral patterns associated with food habits and as an index of nutrient intake. In food studies, the Guttman scale is based on frequency of intake of certain foods, food groups or designated food classifications. Scalogram analysis has an important potential in the study of food habits cross culturally. The rankings in a Guttman scale provide a means of measurement that is independent of specific food items, thus providing a higher level of abstraction and more universal application. Hertzler and Owen state,

> "In this way, each Guttman scale fulfills an analytical function without regard for specific items of content by considering the scale as a measure of less to more, simple to difficult, plentiful to scarce or frequent to rare. Thus scalogram analysis permits the quantitative treatment of qualitative data, because a researcher can combine qualitative indexes of behavior and produce a quantitative measure. It is this aspect of Guttman scaling that provides a method of comparing groups, thereby overcoming the

problems involved in studying exact cultural meanings." (11, p. 377)

Chassy, et al. used scalogram analysis to explore food habits in a rapidly industrializing population in Mexico (9). They hypothesized that diet would become more complex in relation to similar changes in other spheres of social activity. The data consisted of food frequencies that formed a Guttman scale of six items with a coefficient of scalability of .77. Meal variety and food frequency were shown to be correlated with food scale score, notably for noon meal variety, fruit frequency and meat, fish, chicken and egg frequency, suggesting that the food scale was a valid measure of dietary complexity or differentiation. Educational background of head of household, woman's education, occupational history of head of household and house type (standard of living) also correlated positively with food scale score, thus supporting their original hypothesis.

Sanjur, et al. used scalogram analysis to explore infant feeding practices in a rural Mexican village (12). A family food scale (CS=.78) of seven items correlated with occupation of head of household and education of head of household but not with infant feeding practices.

Schorr, et al. applied scalogram analysis to three day dietary records from a sample of teenage students in New York state (13). A seven step Guttman scale with CS of 0.66 was obtained. Validation of the scale as an indicator of diversity consisted of comparing ranking on frequency of consumption of individual foods with Guttman scale ranking. The students' scale positions were found to be highly significantly correlated with food score ranking (tau=.294). Comparison with sociodemographic characteristics showed scale scores to be positively related to father's and mother's occupational level, extent of social participation and employment status. Scale rank was not related to the subject's age, sex or family size. It was also unrelated to number of information channels. Dietary complexity increased as intakes of calcium, iron, ascorbic acid and vitamin A rose.

Hertzler studied feeding practices among 6 month old infants in a New York county (14). She constructed a 17 step scale (CS=.64) from a food frequency questionnaire, which showed progressive differentiation of food use from common infant foods to adult menu items. The scale was interpreted to indicate different capacities within the family to receive and process information of varying complexity.

In a study of differentiation of households in a Ghanaian Community, Larkin, et al. devised a nine-item Guttman scale of family food consumption (CS=.65) (15). Food diversity scores were positively associated with home sanitation, house type and household possessions indicating that differentiation in one attribute tended to be expressed in others as well.

Similar results were obtained in a study of 70 families carried out by Ahmed and van Veen in a small town in the Andes (16). A six step scale was obtained using a household food questionnaire, (CS=.79). Results showed that the groups showing a higher level of dietary complexity had completed more schooling, had a higher occupation and had a higher living standard than those with simpler dietary patterns.

Beaudry-Darisme, et al. collected a one day food intake record from 200 households in two areas in St. Vincent (17). The food consumption pattern fitted a Guttman scale that was consistent with differentiation in other areas such as education and occupation where income was not a limiting factor. They also showed dietary complexity to be negatively associated with incidence of malnutrition in children between 1 and 5 years of age, a lower child mortality ratio and a shorter period of breast feeding.

These studies provide empirical evidence to support the undimensionality of dietary differentiation. Scalogram analysis has been shown to be successful in a number of different cultural situations and in different age groups. These studies further suggest that dietary complexity is a valid measure of differentiation in other social spheres.

There are no reports in the literature comparing intergenerational consistency of food scales except for infant and family food scales. In this case family food scales had little or no correlation with infant food scales (18-20). In the Jerusalem LRC study comparison of nutrient intake between parents and children revealed qualitative as well as quantitative differences (21). For example, children tended to consume less protein, less cholesterol, more sucrose and more total carbohydrate in proportion to energy than did their parents. However, results were not uniform in all sex-age-origin groups. These results could mean a difference in differentiation of some youngsters vis a vis their parents, but it could also mean that they are merely consuming more bread and more sweetened beverages than their parents.

Armstrong used quantitative four or seven day dietary intake data for scalogram analysis of the diets of 150 black preschool children in three Mississippi counties (22). Nine food groups were used: milk, milk products; meat, poultry, fish and eggs; dried beans, peas and nuts; vegetables; fruits; breads; grain products; fats and oils; sugars and sweets. Consumption frequencies determined scale step order. Six scales were constructed for the three counties. In one county all nine foods scaled (CS=.67) while in the remaining two a seven (CS=.65) and 8-step scale (CS=.66) were produced. The latter was collapsed into seven steps that improved the CS to 0.74. The combining of food categories produced cumulative percentages that more closely approximated optimal distributions according to the formula of TenHouton (6). Food groups combined were meat and breads; fats, oils, sugars, sweets in one county; meat and sugars and sweets in another county. Separate scales were also constructed for milk products and for bread products. Validity of the scales was assessed by correlation of the scales with biochemical, nutritional, and anthropometric parameters. Positive correlations were obtained for the total food scales based on seven day records. The milk scale was significantly correlated with two total food scales, height percentiles and nine calculated nutrient intakes.

Sabry, et al. used food frequency data from a sample of 49 preschool children to construct a Guttman scale (23). Food items were categorized in the six food groups comprising the Canadian Food Guide. Responses were classified as positive if the frequency met or exceeded the recommended number of servings and negative if they failed to meet the standard. An acceptable scale (CS=.63) was obtained. However food scale scores did not agree well with nutrient intakes calculated from food records. This discrepancy might be attributed to the different methods used to collect the data (food frequency questionnaire vs. three day record).

In a study of fifty elderly individuals, Harrison devised a seven level scale (CS=.66) based on three day food records (24). The scale dichotomies were based on whether or not the respondents had consumed the recommended number of servings in the Canada Food Guide. No information was reported whether the scales correlated with any other indices of nutritional or socioeconomic status.

All of the Guttman food scales reported above used food frequency tabulations or food records that represented an extended time period of not less than three days, except for the household record of Beaudry-Darisme (17). In a study of 149 families in Northern New York, Sanjur and Scoma attempted to construct a scale for mother's and child's food intake based on a 24 hour recall, but failed to achieve acceptable coefficients of reproducibility and scalability (25). Hertzler also was unable to scale 24 hour recall data for 6 month old infants (14). These are the only reports found in the literature that attempted to scale 24 hour recall for individuals. Twenty four hour dietary recall data are known to distort quantitative assessment or classification of diets on the basis of nutrients. The extent to which frequency (qualitative) data derived from a single day are biased has not been adequately characterized.

Stress and Coping

According to the model proposed in Fig. 1, differentiation is an adaptive response to environments of increasing complexity. Factors that impede this process may be expected to produce stress and inappropriate coping behavior in some individuals, which may eventuate in disease.

A commonly accepted theory states that social incongruity causes disease (2). Social incongruity arises when environmental and social changes demand adaptation that is not made or that is inadequate. Adaptation may be social or personal or both. In a changed situation an individual is better equipped to adapt when he/she has been prepared for it by appropriate conditioning or education. Thus, social change may provoke a range of responses to stress, based to a great extent on antecedent experience.

Acculturation is characteristically a stressful process, and a considerable body of literature has accumulated on this subject. Born has attempted to synthesize various theoretical approaches into a general model (1). The cognitive construct, mazeway, is used as the psychological framework to examine the stresses created by the acculturation process. According to Wallace, mazeway is the entire set of cognitive maps of positive and negative goals of self, others and material objects and of their possible dynamic interrelationships which an individual maintains at a given time. Much of the mazeway develops out of experiences in which the individual learns the behavior appropriate to particular stimuli (26). An altered cultural situation produces severe stress on the individual, due in part to the fact that the individual is faced with new, often misunderstood, expectations. Furthermore, the individual's response in this situation will determine the extent to which he is accepted. Conflict arises due to the incongruity of expectation versus reality, or between legitimate expectation versus anticipated actuality or both. The average enculturated individual automatically grasps the meanings of culturally significant acts whereas the improperly enculturated or mentally ill frequently mismatch acts and meanings.

When the mazeway structures produced in one culture are no longer effective or adequate in the new culture, the individual must either make the necessary adaptation or perish. The process of successful adjustment assumes several modes. As described by Born (1), these include 1 retreatism, a conscious preservation of traditional patterns and resistance to new patterns, 2 reconciliation, a combination of traditional and new patterns, 3 innovation, as complete as possible acceptance of new patterns and 4 withdrawal, overt rejection of both traditional and new patterns.

Lin, et al. have observed adaptational strategies employed by Vietnamese refugees (27). These groups exhibited retreatism, innovation and reconciliation. In addition, the authors describe two types of marginality. Marginality is viewed as the absence of acculturation (as in Born's withdrawal). The individual remains forever at the juncture of two cultures. The condition can be divided into two subtypes: neurotic and deviant. The neurotic type becomes paralyzed while trying to comply with the expectations of two cultures while the deviant opts to ignore both. Either case results in loneliness, rejection and frustration. The poorest levels of adaptation according to these authors include traditionalism and over-acculturation (too rapid adoption of new values), while the highest levels are deemed to be biculturation or reconciliation, in which the refugees attempted to integrate both cultures without undue stress.

Implications of these findings with respect to the current study lie in the potential ability to identify through scalogram analysis those individuals who demonstrate the highest levels of integration.

Differential response to stress has also been proposed by Groen (2). He suggests that social stressors in Western culture may be of two types. In the well-to-do type of civilization it is emotional deprivation, lack of group support and loneliness coupled with material affluence. In the poorer strata there is also emotional deprivation but it is coupled with material deprivation and over-crowding. The first constellation leads to a greater risk of psychosomatic illness, while the lower strata would be more prone to deviant and aggressive social behavior. It would thus appear to be important to have a reliable index of socio economic class, in predicting the nature of the response to stress.

Several conceptual frameworks have guided research on the effects of social stratification on stress. In one, social status is regarded as an average of the values of a number of social indicators such as educational attainment, occupational status, or income, yielding an index of social class. An alternative concept is that incongruence of social status indicators introduces an independent effect in producing stress. A lack of consistency, it is hypothesized, will lead to strain and the strain will eventually lead to a number of psychological and physical ailments. Jackson and Burke studied the relationships between three status dimensions (occupation, education, race-ethnicity) and symptoms of stress in an American population sample derived from a national survey (28). Each status dimension was divided into three ranks and each respondent assigned a rank on each dimension. Each respondent was thus characterized by a pattern of three status ranks. Stress symptoms were derived from responses to a questionnaire designed to elicit frequency and severity of such symptoms as dizziness, nightmares, shortness of breath and stomach upset. Regression analysis showed that a simple additive model was not adequate to explain variations in symptom level by status. Two alternative models incorporating separate terms for status inconsistency as an interaction effect showed better fit of the data. In the first model terms for the effects of sharp status inconsistency were included in the simple additive mode. Sharp status inconsistency for an individual was defined as having a difference of two rank levels among the three assigned status ranks: occupation, education and race-ethnicity. Results using the first model suggested that occupational and educational rank were negatively related to symptom level, that racial-ethnic rank was positively related to symptom level and that all forms of sharp status inconsistency produced more or less equal increments in symptom level.

The second model included terms for the additive effects of occupation and education and for the effects of sharp inconsistency but not for additive racial-ethnic effects. Like the first model, this analysis showed that educational and occupational rank were negatively related to symptom level and that sharp education-occupation inconsistencies increased symptom level. Unlike the first model, this analysis indicated that inconsistency between high ascribed status (race) and low achieved status (occupation, education) had a much greater impact on symptom level than the converse form of discrepancy.

Jackson has ascribed the stressful impact of status inconsistency to conflicting expectations (29). A person's rank on a status dimension controls in part his expectations of others, of himself, and others expectations of him. When expectations conflict, the individual is unable to satisfy all of them, resulting in frustration. The frustration may be especially severe because expectations may be raised to a high level by one rank and blocked by a low rank in another dimension. Another consequence is uncertainty in the individual with respect to what he can rightfully expect from others and they can expect from him.

Jackson attempted to measure psychophysiological symptoms related to status inconsistency in a U.S. national sample (29). Status dimensions included occupation, education and racial-ethnic background. Individuals were assigned to one of three rank levels. Individuals were then assigned to categories based on the combined ratings. Status consistency was defined as consistent if all three ranks were the same, moderately inconsistent with two like ranks and a deviation of one rank step in the third dimension. Sharply inconsistent patterns were divided into two categories: persons with no like ranks and persons with a two rank deviation in at least one dimension. Stress symptoms were derived from responses to a questionnaire. Results showed that degree of status inconsistency was positively related to symptom rate when the racial-ethnic rank was superior to occupational or educational rank, and for males, when occupational rank was superior to educational rank. For females symptoms increased when educational rank was superior to husband's occupational rank. Inconsistent status patterns in which occupational or educational rank were superior to racial-ethnic rank were not associated with higher symptom rate. This study suggests that achieved status in relation to ascribed status is associated with a somatic response, whereas low ascribed status coupled with high achieved status influences the individual to respond in a different manner. The differential responses associated with type of inconsistency and sex of the respondent have important implications in study design. Furthermore, they suggest that combined measures of "average status" underestimate the true impact of status on stress.

Meile and Haese investigated similar conceptualizations of social status (30). One approach envisioned social status as the average of various status indicators while the other emphasized the effects of status incongruence. Data were derived from a national probability sample. Occupational and educational status were obtained for respondent and head of household. Symptoms of mental stress were obtained by questionnaire. Results showed that both education and occupation were significantly inversely related to stress symptoms. When status incongruence was examined, status congruents and incongruents had a similar probability of stress symptoms. Amount of incongruence, likewise did not appear to be related to rate of mental stress. These findings are contrary to those reported by Jackson and Burke (28).

The reports cited above provide a theoretical and empirical basis for examining incongruence in relation to differentiation. According to the model proposed in the present study, incongruence would lead to stress unless coping behavior operated to reduce stress. The latter would be manifest in increased differentiation.

Exposure to extreme and prolonged trauma is generally detrimental to subsequent adaptation. This is the conclusion of several studies of concentration camp survivors (31). The fact that a substantial minority do adapt successfully raises questions of effectiveness of various coping strategies. Antonovsky and Kats have proposed three explanations based on a study of Israeli concentration camp survivors (32); (1) an initial underlying strength derived from the quality of early home environment (These people were after all "survivors"), (2) subsequent environment which provided opportunities to reestablish a satisfying and meaningful existence, (In this sense survivors who came to Israel may have had advantages over survivors who went to other countries) and (3) a "hardening" process which allowed the survivor to view current stresses with some equanimity.

Stress and Cardiovascular Disease

Cultural discontinuity. A large body of literature exists to support the contention that stress is an important factor in the development of heart disease.

Donnison proposed in the 1930's the hypothesis that successful childhood integration of the inborn drives into socially acceptable patterns is a critical factor in creating a stable non-hypertensive society (33). Observed prevalence of hypertension in industrialized societies was attributed to failure of older persons to adapt to revolutionary changes in the mode of living and to transmit appropriate modified social patterns to the young. Support for this theory was later supplied by Scotch, who showed in a study of urban and rural Zulus that the prevalence of elevated blood pressure was significantly higher in the urban population than among the rural population (34). Most of the variables associated with hypertension were related to social conditions that could lay the groundwork for non adaptive behavior. The urban hypertensive was more likely to live in an extended family, have a lower income, resort to witchcraft to explain illness and retain traditional religious beliefs, than was the non hypertensive. These variables were not related to hypertension in the rural population. These results suggest that rather than change itself, it is the response to change the induces hypertension. Whereas traditional lifestyle patterns were adaptive in rural areas, they become dysfunctional in the urban environment.

Examination of blood pressure distributions in a number of populations shows that rise in blood pressure is not necessarily a natural concomitant of aging. Pressure curves from 18 different cross sectional studies were compared by Henry and Cassel (35). The populations that exhibited stable blood pressures across the adult age span tended to be those in which the culture was stable, traditional forms honored, and members were secure in their roles and adapted to them by early experience. Industrialization per se did not appear to be a factor since the stable blood pressure groups included a group of U.S. Naval aviators as well as inhabitants of a Russian arctic industrial city. The authors suggest that during childhood, adolescence and early adult life, society inculcates its value systems. Stress develops when the aging individual finds himself or herself in a different social milieu to which it is hard to adapt because the prevailing values are not adopted.

Comparison of blood pressures from surveys of Bavarian Trappist Monks in 1930 and American contemplative monks thirty years later showed a striking increase in blood pressures beyond the 4th decade in the American population. This observation was thought to be related to the fact that the Catholic church had undergone profound self evaluation during that period, and relaxation of rules of silence. Henry and Cassel suggest that these changes introduced conflict between old and new order aspirations (35).

Syme, et al. evaluated social and cultural factors associated with coronary heart disease (CHD) in a six county area of North Dakota (36). Information on all CHD cases occurring in this area in a one year period in white men age 35 and over was compared to that obtained from a control sample drawn from the same population. Subjects were classified according to background (European or American), residence (urban or rural) and occupation (agricultural, blue collar or white collar). White collar workers had an incidence of CHD almost twice as high as blue collar or agricultural workers. Men of urban American background, regardless of occupation exhibited a high incidence of CHD. Men of rural background whether American or European in white collar occupations had a substantially higher rate than either agricultural or blue collar workers. The authors suggest that discontinuity between parental background and present activities may be related in some way to the development of coronary heart disease. Such discontinuities involve change and require a person to adapt. The authors further suggest that urban Americans, who also had a high CHD rate, live in a changing environment requiring personal adaptation to a greater extent than those living in a rural setting.

The data were further analyzed to determine whether the above relationships could be explained by their association with overweight, hypertension and smoking. Subjects were classified into three categories. All white collar workers of rural background and all men who were either geographically or occupationally mobile were placed in the "highly mobile" category. Into the "stable" group were placed all farmers of rural background who were either occupationally or geographically stable. The remaining subjects were assigned to what was called a "moderately mobile group." Results showed that while men who smoked had a higher CHD rate than those who never smoked, the rate for smokers in the highly mobile group was more than twice that in the stable group. When reported cases of hypertension were compared across sociocultural groups, there was a two fold increase in coronary heart disease from the stable group to the highly mobile group within the non-hypertensive category. It was also shown that in each of three weight categories CHD rates increased substantially with mobility. These comparisons suggest that sociocultural factors are independently related to coronary heart disease and that cultural discontinuity or incongruity may be the underlying mechanism.

Similar results were obtained in a study of a more urban California cohort (37). It was found that men with foreign born fathers had a ratio of observed to expected number of CHD cases two times as high as men with native born fathers. While no statistically significant differences were found between cases and controls for occupation and place of residence, considerable differences were observed when parental background was included in the analysis. White collar workers of American born parentage had a ratio about three times higher than blue collar workers of foreign parentage. College educated sons with foreign-born fathers had a higher ratio of observed to expected CHD cases than lesser educated sons with foreign born fathers. College educated sons of foreign born fathers also had a higher ratio than college educated sons with American-born fathers. Men who worked at three or more jobs in a lifetime and spent less than 30 years at their principal occupation had a ratio over four times that of men who had worked 30 years or more and worked one or two jobs in a lifetime. When other risk factors were taken into account, these sociocultural factors were associated with the occurrence of coronary heart disease independent of parental longevity, cigarette smoking, relative weight status and physical activity.

The impact of cultural discontinuity can be adduced from the above results, to the extent that parental attributes define cultural experience. The highest ratios for CHD were observed in groups with disparate educational, occupational, or residential experience as adults from that as children.

Cassel and Tyroler have examined the impact of culture change on health in a rapidly industrializing community (38). They postulated that rapid culture change is likely to have deleterious consequences when it leads to the development of incongruities between the culture of the population at risk and the demands and expectations of the new social situation.

The study population was drawn from the labor force of a manufacturing plant located in a small industrial city which previously had been a small rural hamlet. Two groups of workers were identified according to the recency with which they had undergone the changes accompanying industrialization. The first generation group, were children of farmers and represented the people who had most recently undergone the change from rural to industrial culture. The second generation were children of previously employed factory workers. Comparison of morbidity, based on sick leave and questionnaire data, between the two groups showed that the first generation workers had poorer health records than the second generation. First generation workers had fewer sick leave absences when recently employed compared to second generation workers. With increasing length of service, however, they did not exhibit the decline in absences characteristic of the second generation and their rates were consequently higher. The authors attributed these differences to incongruity between the earlier culture of the first generation workers and the social situation of the factory. Values, attitudes and framework of knowledge acquired during the formative years equipped them to live in the rural mountain cove but proved inappropriate in the changed social situation. Second generation factory workers, on the other hand, acquired the skills early in life that would enable them to adjust to the demands of factory life.

Tyroler and Cassel also studied the effect of urbanization on coronary heart disease mortality (39). They showed that rural white males between the ages of 55 and 64 exhibited a relatively marked increase in mortality as the index of urbanization increased. While it cannot be ruled out that selective migration of sicker individuals to more highly urbanized counties to seek better medical care occurred prior to the study, this did not appear likely as this particular population had exhibited remarkably little migration.

Like the studies cited in the previous section these studies support the contention that cultural incongruity is stressful and that manifestation of disease, specifically CHD, is related to development of appropriate coping behavior. Also like the previously cited studies, there is a body of evidence suggesting that hypertension and CHD are associated with various social status incongruities.

Social differentiation. According to Lehrman, all human societies are to a certain extent internally differentiated (40). Not only are they differentiated but the differentiated roles and activities are valued differently. A social class consists of a set of people of about equal rank or prestige who would be considered acceptable for social interaction that is regarded as symbolic of equality. A problem arises in finding valid indices of social class. Various indicators have been used to relate social class to coronary heart disease.

Kahl and Davis computed and compared scores on each of 19 different indicators used by social researchers (41). They found high positive correlations among the ranks computed by each of these items. They suggest that occupation is a reliable measure, especially in cross cultural comparisons. These studies were conducted nearly three decades ago, however, and considerable social change has occurred in the interim. Of particular import may be the increased numbers of dual-wage earners in families. Furthermore, stratification of population samples on the basis of a single indicator will not reveal status inconsistencies within individuals.

Among the ecological approaches, Lilienfeld used the median rental rate of census tracts and related this indicator to CHD death rates within the tracts (42). He concluded that median rental and coronary death rates were inversely related. Kent, et al. ranked 83 health areas of Manhattan on the basis of median income and deaths from atherosclerotic disease (43). They found that the health areas below the aggregate median income were more likely to have death rates above the combined median death rate. Stamler, et al. in a study of Chicago coronary deaths related median family incomes of census tracts to CHD deaths in those tracts (44). They found little difference in death rates except among the lowest income stratum for white males, who had one and a half to three times the risk of other groups (44).

Ecological associations carry some risk in interpretation. It is unwarranted, for example, to impute individual risk on the basis of attributes within ecological contexts (45,46). Since there generally are no purely homogeneous samples, it cannot be ruled out that excess death rates were not contributed by an atypical segment of the population. Ecological comparisons can, however, provide clues for studies using more refined techniques.

Christenson and Hinkle studied two groups of middle class managerial employees who had similar work and socioeconomic environments and job responsibilities but differed in educational background (47).

Group C were college graduates hired for managerial positions while Group H were high school graduates who had risen through the ranks. Illness episodes recorded over the course of a year's observation were significantly higher in Group H than in Group C. Group H men also had a significantly greater number of chronic active illnesses: more acne, constipation, dental cares, arthritis, bronchitis and symptoms of anxiety and tension and also more impairments resulting from previous diseases. The estimated risk of death, although small was 10 times greater in Group H than in Group C. More Group H men had blood pressures greater than 140 mmHg systolic or 90 mmHg diastolic. Obesity was also more prevalent in Group H. It is noteworthy that although the two groups appeared to be similar in outward characteristics such as income, job status and type of residence, the two groups were strikingly different in background from birth to age 12. Group C men were predominately fourth generation Americans, sons of white collar workers who were at least high school graduates. They had grown up in middle to high income families in medium to substantial neighborhoods. By contrast, most of the Group H men were sons and grandsons of immigrants. Their fathers had been skilled and unskilled laborers with, on the average, a grammar school education or less. Group H men had grown up in substandard neighborhoods in low income families. Thus during the period of observation, Group C men were living and working in an environment with which they had a lifetime familiarity while Group H men were living and working in an environment different from their previous experience, one which they perceived as new, unfamiliar and full of challenges. The authors point out the pitfalls in assuming that groups differ on only a few measurable characteristics, in this case, education, while in fact there may be profound differences.

Coping. Psychosocial and cultural factors that affect health can be divided into two categories. Those factors that are deleterious to health usually called stressors, and those that serve a protective or buffering function against noxious stimuli. Coping is viewed as a strategy for reducing stress and thus would have a health promoting function. According to Dressler, coping dispositions may be divided into two types: direct action and defensive dispositions (48). In the former, the individual, is able to identify correctly the stressor and take appropriate action to reduce the stress. Defensive dispositions refer to the use of one of the psychodynamic defense mechanisms such as denial or suppression, to gain psychologic control of the stressful situation.

The importance of social support systems in determining coping effectiveness is now being recognized. Dressler examined the relationship between coping dispositions, social supports and health status as measured by blood pressure. Coping dispositions were derived from responses to a situational questionnaire. Data were obtained from a probability sample of 44 males and 56 females living in the West Indies. Responses were categorized as activity, suppression, or denial. Social support systems included conjugal relationships, kinship systems and participation in mutual aid societies. Exposure to stress was calculated by comparing the respondent's score on a scale measuring the acquisition of material items associated with a Europe-American lifestyle to their score on an occupational scale. The material item scale measures the attempt to attain and maintain a high material status lifestyle while the occupational scale measures the economic resources. When material status is high and economic status low, it was reasoned, that individual is under lifestyle stress.

Results showed that for activity and suppression, those individuals with the highest blood pressure were those under high stress but who showed low activity, low suppression and high denial disposition. With respect to social support systems, the lowest blood pressures were found in those individuals who were not under stress and who were members of a social support group. These results support the hypothesis that direct action coping disposition is very effective in mitigating the deleterious effects of chronic stress. The biochemical mechanism proposed is that chronic anxiety increases the rates of secretion of specific hormones and neuromuscular transmitters. The reduction of this reaction pattern by active coping is associated with better health status.

Ostfeld has suggested that a deleterious social situation in which high blood pressure might appear could be one in which aspirations are blocked, meaningful human intercourse is restricted and the outcome of important events in the lives of individuals is uncertain (quoted in 49). Results of an 11 year prospective study of the role of the interaction of personality and stress in the pathogenesis of hypertension conducted by Harris and Singer tend to support this thesis (50). They found that prehypertensive college women were more likely to experience abrasive, tense and hostile interactions with other people than were the non hypertensive women in the control group. In another study reported by Harris and Singer, senior officers of an insurance firm showed a mean blood pressure rise of 0.6 mmHg per year over 30 years compared to 1.9 for the firm's clerical workers and 2.9 for clerical workers with stomach ulcer (50). Presumably the senior officers were better adapted socially.

The studies reported here clearly point to stress mediated development of disease. Incongruity appears to be important in setting up the potential for stress. Ability to cope depends on a number of factors that are not clearly defined but apparently relate to early experiences and to personal attributes that allow the individual to identify the stressor correctly and take appropriate action. Part of the difficulty in defining the relationship of coping, stress and disease can be related to difficulties in measurement. Social class indicators tend to be culture bound and may exhibit secular variability. Differentiation, on the other hand, is a more abstract concept and encompasses the universe of attributes of which social class may be a sub set. Differentiation may thus be a more useful concept in explaining or predicting adaptive potential of individuals or groups cross culturally.

METHODS

Measurement of Variables

Population The data were collected between 1976 and 1980 as part of the Jerusalem Lipid Research Clinics (LRC) Prevalence Study under National Heart, Lung and Blood Institute contract N01-HV-5-3015-L. The study was funded in order to take advantage of the unique multiethnic characteristics of the Jerusalem population embracing four major origin groupings: Israel, North Africa, Europe-America and Asia. The Prevalence Study population consisted of all 17 year old Jewish residents of Jerusalem who were eligible for military service and a sample of their parents.

Details of the sampling strategy have been published elsewhere (51). Briefly, all male and female Jewish residents appearing for their compulsory physical examination prior to induction into the Israel Defense Forces were invited to participate in a health survey. The screening was carried out in two phases. During Visit 1, a blood sample was taken for lipid and lipoprotein quantification and a brief questionnaire was administered which obtained sociodemographic data. A 20% random subsample was invited to return for a second visit (Visit 2) during which a detailed medical history and physical examination were obtained and a twenty four hour dietary recall administered. Five consecutive cohorts of individuals were screened.

The parent population sample was based on a random sample of parents of inductees screened at Visit 1. From the first two cohorts, a 25% sample of parent pairs (ie., father and mother) was selected for screening at Visit 1; from the third cohort, 50% and from the last two cohorts 100% of the parent pairs were selected. Of those attending Visit 1, parents, 20 and 50% of the fathers from the first two and from the last three cohorts, respectively, and 20% of all mothers were invited at random for further examination at Visit 2. The screening procedure was identical to that for adolescents except that parents received a graded exercise electrocardiogram.

Participation rates for Visit 1 ranged from 68.2% for adult males to 90.2% for adolescent males. At visit 2 the participation rates ranged from 74.5% for adolescent males to 86% for adult females. Examination of data on non-responders did not reveal any important biases in the variables included in the present study (51).

Diet Dietary data were obtained by means of a 24-hour recall referring to the day immediately preceding the 12 hour fast required for blood tests. However, if the participant reported that due to this imposed fast, he or she omitted some food or a meal usually consumed in the evening, the period of the recall was started 24 hours before the initiation of the fast. Interviews were conducted throughout all seasons of the year with the exception of Passover. In Israel the Sabbath extends from Friday evening to Saturday evening, during which ceremonial meals are eaten by many families of all origin groups. No interviews were taken on Saturdays and thus no dietary data reflect Friday intakes. For the parents no interviews were conducted on Fridays and hence no dietary information was obtained from them for Thursdays also. All interviews were carried out by dietitians who had been trained and certified according to an international LRC protocol

(Appendix 1). Standard food models, packages, geometric models and utensils were used during the interview to increase accuracy of reporting. Participants were asked to recall in detail all items of food and drink consumed during the previous 24 hours.

The interviews were summarized on a precoded form by the dietitian who conducted the interview. A condensed food table was used in which food items were grouped according to type (meat, milk, fruit, etc.) and according to their content of energy, protein, fat, carbohydrate, sugar, starch, cholesterol, alcohol and ratio of polyunsaturated to saturated fat. Composite foods in the recall were broken down into individual food item components. Any items that could not be coded under existing items on the form were calculated under a diet miscellany code. The diet miscellany items were later assigned a food group code so that food item analysis of the dietary data would be possible.

The nutrient content of the food items was derived from several sources. In order to maintain international consistency, United States Department of Agriculture (USDA) data were used wherever local production techniques were thought not to affect the level of nutrients under study. Local data were used for all manufactured items.

Quality control was maintained through a rigorous program of duplicate coding. Ten percent of all interviews were selected at random periodically and were recoded independently by another Jerusalem LRC dietitian. The mean rate of coding errors as percent of total food items reported in the interview was 1.5% (range 0.8 to 3.0%). In addition 5% of the Jerusalem recalls were sent to the LRC Program Office at the National Heart, Lung and Blood Institute, Bethesda, MD, for monitoring by this investigator.

For the present study only data from recalls that were coded as representing usual intake were used. Recalls judged by the interviewer to be unreliable were excluded from analysis. Unreliability was usually attributed to inability to remember one or more meals or reporting illogical amounts such as a 20 ounce chicken leg. In addition, recalls reported as atypical, for example, considerable under consumption due to illness or over-consumption due to a wedding celebration, and recalls from respondents on special diets were excluded.

From a total sample of 2906, 730 were excluded because of atypical or special diets, this represented 26%, 28%, 23% and 25% of the recalls for Israeli, Europe-American, Asian and North African participants, respectively. An additional 16 recalls were later excluded during the scalogram analysis because of nonresponse to items in the scale. Thus the final scales were based on sample sizes of 641, 487, 609 and 423 for Israeli, Europe-American, Asian and North African groups, respectively. Of this number there were only 106 spouse pairs, 102 father-child pairs and 54 mother-child pairs, by virtue of the Visit 1, Visit 2 sampling design.

Anthropometry Standing height was measured without shoes on a balance beam scale to the nearest 0.5 cm. Weight was measured to the nearest 0.1 kg for adults wearing ordinary street clothes. Adolescents were weighed wearing underclothes. Quetelet's Index was calculated as Weight(kg)/Height(m)^2.

Smoking Participants were asked if they currently smoked cigarettes and, if not, whether they had smoked in the past. Current smokers were asked to state how many cigarettes they smoked daily and whether they inhaled.

Alcohol intake In addition to alcohol intake obtained in the 24 hour recall, participants were asked a series of questions pertaining to alcohol intake during the previous year and week. In the seven day recall each participant was asked how many bottles of beer and glasses of wine, mixed drinks and liqueurs were consumed during the previous week.

In the present study alcohol intake was used as an indicator of secular drinking behavior. Since ceremonial consumption of wine is an integral part of Sabbath, it was necessary to separate the ceremonial use of wine from secular consumption of alcohol. For this analysis then, participants were classified as "non-drinkers" if they had consumed one or fewer glasses of wine during the past week and had not consumed any other type of liquor. Frequency of drinking for "drinkers" was calculated as number of drinks by alcohol type excluding wine.

Demographic variables

Age

Age was calculated from self-reported date of birth.

Origin

Origin of participants was designated according to the scheme of the Israel Central Bureau of Statistics. Four categories were used according to place of birth: Israel, Europe-America (including South Africa and Oceanea), Asia and Africa north of the Sahara. Since most of the adolescent population was born in Israel, origin was assigned according to father's place of birth. In most cases father's and mother's origin were the same. About 23% of adolescents were of heterogeneous parental origin.

Education

Educational attainment was based on reported number of years in school. However, a special problem involved quantification of long term full time religious study by orthodox men. Thus, years of secular and religious education were added. If the participant was a member of the free professions or an academic, his maximum number of years of education was set at 20. For teachers with religious education, the maximum was 15; for all other occupations, the maximum was set at 12 years if secular education was less than eight years. If secular education was less than eight years, a maximum of four years was added for religious education.

Occupation

Occupation was obtained for head of household only. A six point scale based on occupational prestige was used to classify adult participants (rank 1 = highest). The scale was developed specifically for the Jerusalem LRC, however it shows a high correlation with the British Registrar General Scale (Spearman's rho = .87).

Blood pressure: Blood pressure was measured on the right arm, after the participant had been sitting for at least five minutes. Four blood pressure measurements were obtained, the first by use of a standard sphygmomanometer and three with a random-zero sphygmomanometer.

The blood pressure variable used in this study is the mean value of the second and fourth readings.

Plasma cholesterol: Plasma total cholesterol was estimated from blood samples obtained after a 12 hour overnight fast. A two step method involved (1) preparation of an isopropanol extract of plasma and subsequent treatment with zeolite mixture to remove phospholipids, glucose and bilirubin and (2) simultaneous determination of cholesterol and triglyceride levels by use of the AutoAnalyzer (AA-1 or AA-2). Details of the method are reported in reference 52.

Statistical Procedures for Each Sub Problem

1. Guttman scales: Guttman Scales were constructed for each origin group from coded food items in the Jerusalem LRC food table using the SAS Guttman Procedure program (53). This program limits to 12 the number of food categories that can be entered in a single analysis. Therefore, it was necessary to condense the 144 items in the food table into 12 categories. The rationale for these groupings was based on the nutritional and functional roles of foods in the diet. The food item content of the various categories is shown in Appendix 2. Because of the limitations placed on number of categories, food items were first combined in broad categories having similar macronutrient content such as dairy, grain and meat-fish-poultry. Then subcategories of foods were defined that have a functional role. For example, dairy was broken down into beverage (fluid milk and cream) and solids (cheese, yoghurt). Grains were broken down into bread and crackers and grains that are served hot (rice, pasta). Similarly, potatoes were separated from other vegetables; butter, from cooking fats. Eggs were combined with cheese

(and later separated). It was reasoned that dietary differentiation would be manifest in greater structural complexity, ie., use of foods associated with particular eating occasions, as well as greater variety of food. Thus all of these permutations, and more, were tried during the iterative process required to achieve the best fit of the data to the scales for each origin group.

The SAS Guttman Procedure creates and evaluates a Guttman scale model for a set of items represented by binary variables. For the present analysis the dietary recalls were evaluated in terms of use or non-use of each of 12 categories, regardless of quantity consumed or number of individual items consumed within the category. The program then arrays the participants on the basis of the number of positive category responses, i.e., 12 - 0, and the items on the basis of frequency of positive responses, from least to most frequently consumed. Scale scores are designated in a step wise manner from score 12, showing the number of participants who consumed 12 categories down to 0, showing the number who consumed none of the categories in the scale. Errors are calculated on the basis of negative responses appearing in a positive field and positive responses in a negative field. This matrix is then evaluated according to traditional Guttman scale criteria: coefficient of reproducibility (CR), mean marginal reproducibility (MMR), percent improvement, and coefficient of scalability (CS). A correlation coefficient for each item and the sum of the other items is also calculated.

Using the above criteria, each food item was evaluated with respect to its contribution to the total error rate, its correlation with other items in the scale and its marginal reproducibility. An iterative process then followed whereby food categories were manipulated until the best fit to the Guttman model was achieved.

In this analysis the Guttman scales were further evaluated according to a probability model formulated by Proctor (7,8) and contained in the SAS Guttman Procedure.

The Proctor model provides a statistical basis for evaluating response errors. The computer program provides estimates of the proportions of true types in a population, their standard errors and a chi square goodness of fit statistic. For each distinct response pattern, observed and predicted frequencies, contribution to the chi square statistic and the true type with the largest posterior probability for that response pattern are provided. Using both the SAS Guttman Procedure and Proctor option it is possible to evaluate both reliability of items and the probability of misclassification of participants.

In the present study both traditional criteria and the Proctor model were used to define the scale items. Since none of the scales reached acceptable criteria for reliability and scalability, the Proctor model was used to reclassify participants whose response patterns showed the highest probability of misclassification (Chi square >6.0). The proportion of individuals thus affected was highest in the Israeli scale, 20%, and lowest in the Asian scale, 2%; those in the European-American and North African scales were 13% and 15% respectively.

Two reclassification schemes were examined. First, misclassified participant responses were recoded to conform to their expected true types. Alternatively, they were considered to be non scalable and scored as missing values.

The Guttman procedure was rerun and the respective scales evaluated according to traditional Guttman criteria of reliability (CR=.9) and scalability (CS=.6). Following the Proctor adjustment, all scales except the Asian scale reached acceptable standards of reliability and scalability. The Asian scale had a CR of .9 and CS .53. The Asian scale initially had only 2% grossly misclassified. Adjusting the responses increased the proportion misclassified to 4%. Thus, no further adjustments were attempted in any of the scales, although in each scale some misclassified response patterns remained.

The adjustment that replaced the observed response pattern frequencies with the theoretical frequencies resulted in slightly better scales than did the exclusion of misclassified response patterns. Therefore the scales derived from the former adjustment were used in all succeeding analyses.

Since each scale was constructed independently for each origin group, it could be expected that there would be variation in the items contained in the scale. The distribution of Guttman scale scores is a function of the items in the score and the number of respondents endorsing each item. Unless the marginal frequencies for each score are similar across scales, it is difficult to pool the data. In the present study there was a highly significant effect of origin on frequency distribution of Guttman scores. For example, the average Israeli score was 3.5; European-American, 2.8; Asian, 2.7; and North African, 3.4.

In order to pool the data to obtain larger sample sizes, the scales were combined as follows: for Israeli and North African scales, scores greater than 3 were classified as "high", and for European and Asian scales, scores greater than 2 were classified as "high." All other scores were classified as "low."

The above procedures produced two Guttman scale variables for analysis: (1) origin specific Guttman scales and (2) a dichotomous complexity scale, derived from the Guttman scales that could be used for pooled samples.

2. Sociodemographic analyses: For the sociodemographic analyses all origin groups were pooled and classified into high and low complexity groups. Data from mothers and fathers were analyzed separately using SPSS programs (54).

Age

Mean age in years was computed by high and low complexity level. Significance of the mean differences was computed using Student's t test.

Education

Mean years of secular education and secular plus religious education (see page 43) were calculated for high and low complexity level for fathers. Mean years of secular education for high and low complexity level were calculated for mothers. Mean years of secular and secular plus religious education for head of household by high and low complexity level were also calculated for mothers. Differences were compared using Student's t test.

Occupation

The six-point occupational scale described previously was collapsed into three codes. Occupational level of the head of household was then calculated by high and low complexity levels and the differences evaluated using the chi square statistic.

Crowding index

A crowding index was calculated as the reported number of residents in the participants' residence divided by the number of rooms . A four level scale was then developed with the following values: <1, 1-2, >2-3, 3. All origins were combined and stratified by crowding index and complexity index. Joint distribution frequencies were generated and the chi square statistic used to evaluate differences between observed and expected frequencies.

Year of immigration

Participants were classified into five categories based on self-reported year of immigration as follows:

1. $<$ 1948
2. 1948 - 1957
3. 1958 - 1967
4. 1968 - 1977
5. $<$ 3 years

Europe-American, Asian and North African origin groups were combined and stratified according to period of residence in Israel and high and low complexity level. Joint frequency distributions were generated and differences evaluated using the chi square statistic as described above.

Status Consistency:

Status consistency was evaluated in the following ways:

Education

Education was classified into three categories: less than high school, high school graduate, and training beyond high school. A consistency score was then computed for all spouse pairs: 1, same educational level; 2, differing by one degree; 3, differing by two degrees. Consistency of spouses' education by high and low complexity level and by Guttman scale score were analyzed using the chi square statistic.

Origin

Spouse pairs were classified as homogeneous if both spouses originated from the same continent, otherwise they were classified as non-homogeneous. These groups were then compared by high and low complexity strata and by Guttman scale scores using the chi square statistic to evaluate differences in the joint distributions. Rank order correlation coefficients of spouse Guttman scale scores in homogeneous and non-homogeneous spouse pairs were also computed.

Origin-Education

A status consistency variable was created using level of education and origin according to the algorithm in Appendix 3. Education was stratified into three levels as described above. North African and Asian origin groups were combined so that there were three values for both education and origin variables. If both spouses were equal in origin and educational attainment, each was given the value 1 (consistent). Spouse pairs that differed by two levels in education and were not equal in origin were given a value of 4 (sharply inconsistent). Joint frequency distributions were generated for status consistency scores 1-4 by low and high dietary complexity level for mothers and fathers separately. In a separate comparison, the four status consistency levels were collapsed into two categories. The chi square statistic was used to evaluate differences in the distributions.

3. Diet: Nutrient intake by Guttman scale score was calculated for each origin and sex group, parents and children separately. The following nutrients were evaluated using a one way analysis of variance (ANOVA) procedure contained in SAS programs: total energy intake, protein, fat, carbohydrate, alcohol, sugar, saturated fat, and polyunsaturated fat as percent of calories; total calories per kilogram body weight and total cholesterol. A subsequent one way ANOVA evaluated monounsaturated fat, other carbohydrates and starch as percent of calories and the ratio of polyunsaturated to saturated fat using SPSS programs. The effects of Guttman scale score on nutrient intake were evaluated using the F statistic.

Day of the Week

Dietary recalls were categorized according to whether the day of the food intake was a workday or a day off. The effects of workday status on Guttman scale score and dietary complexity index were analyzed for each origin and sex group, parents and children separately, using the SPSS one way ANOVA procedure as described above.

Health status: Smoking history, alcohol use, Quetelet Index, blood pressure and plasma cholesterol in relation to dietary differentiation were evaluated in two ways. First, all origin groups were combined and stratified according to high or low level of dietary complexity. Mean levels of each health status variable were then compared in the two groups and differences evaluated using the SPSS t test procedure.

In a second analysis, the effect of Guttman scale score was evaluated in each origin group using a one way ANOVA in which Quetelet Index, systolic and diastolic blood pressure, plasma cholesterol and frequency of alcohol consumption were each entered as dependent variables. Differences between groups were tested using the F statistic.

RESULTS

Guttman Scales

Item content The initial listing of food class variables contained 12 items, the maximum number allowed in the SAS program. This number was reduced in subsequent iterations to five items, which provided the best fit to the Guttman scale model.

The resulting SAS Guttman scales are shown in Appendix 4, beginning on page 124. A summary of Guttman scale item responses by origin group is shown in Table 1, page 54. The items are remarkably similar across the four origin groups. All scales contained fruits and vegetables in the first level. Ninety nine percent of respondents consumed some form of fruit or vegetable. Three of the four scales contained meat in the second level. About ninety percent of the respondents consumed some form of meat, fish or poultry. The Asian group scale had vegetable fat at the second level with 88% consuming the item. However meat (not included in the scale) was only slightly less scalable than vegetable fat for this group. Desserts occupied the third level for Asians (60% consumption) and North Africans (80% consumption). Starch (rice and pasta) was third for Israelis (80% consumption) and eggs were third for Europe-Americans (58% consumption). Eggs were fourth for Israelis and North Africans (57% and 49% respectively). Potato appeared only in the scale for Europe-Americans (23% consumption). The most discriminating items were seeds; 15% of Israelis and 21% of North Africans consumed

Table 1. Summary of Guttman scale items responses by origin group.

item	origin* 1 (n = 641) score	%	2 (n = 487) score	%	3 (n = 609) score	%	4 (n = 423) score	%
fruit-vegetable	1	99	1	99	1	99	1	99
meat	2	89	2	90			2	91
vegetable fat					2	88		
desserts					3	60	3	80
starch	3	80						
eggs	4	57	3	58			4	49
potato			4	29				
seeds	5	15			4	23	5	21
butter			5	13	5	11		

*Origin groups: 1 = Israeli, 2 = Europe-American, 3 = Asian, 4 = N. African seeds; and butter for Europe-Americans and Asians, 13 and 11% of whom consumed this item.

Evaluation. None of the four crude scales achieved acceptable standards of reliability and scalability (Table 2). This means that they were not reliable predictors of food intake of individuals. However, the purpose of this investigation was to achieve a rank ordering of individuals on the basis of differentiation as expressed in food intake. Quasi scales that do not meet Guttman criteria have been used for this purpose in the past (3). Thus it was deemed legitimate to pursue the intended investigation.

As shown in Table 2, the Proctor formulation used to reassign grossly misclassified individuals into their theoretical true types produced scales that did meet the Guttman criteria for scalability and reliability except for the Asian scale, which was borderline. Since this initial adjustment produced acceptable scales for three of the four origin groups, no further adjustments were attempted although there continued to be some residual misclassification. The probabilities of misclassification according to the Proctor formulation were 0.05, 0.05, 0.07 and 0.06 for Israeli, Europe-American, Asian and North African groups respectively. Scale reliability, defined as the correlation between true types scores and observed response patterns scores before and after adjustment, as seen in Table 2, remained relatively unchanged for the Asian group. Therefore no further adjustment of the Asian scale was attempted.

The estimated proportions of true types by origin group before and after adjustment are shown in Table 3. It can be seen here also that

Table 2. Evaluation of crude and adjusted scales

criteria		crude scale	Proctor adjustment*
Israeli scale			
	CR	0.8621	0.9470
	MMR	0.7738	0.8162
	CS	0.3903	0.7114
	SSR	0.7830	0.9211
Eu. Am. scale†			
	CR	0.8924	0.9433
	MMR	0.7832	0.8086
	CS	0.5038	0.7039
	SSR	0.8140	0.9097
Asian scale			
	CR	0.9153	0.9238
	MMR	0.8204	0.8246
	CS	0.5283	0.5655
	SSR	0.8351	0.8546
N. African scale			
	CR	0.8676	0.9300
	MMR	0.7603	0.7986
	CS	0.4477	0.6526
	SSR	0.7822	0.8909

CR: Coefficient of reproducibility.
MMR: Minimum marginal reproducibility.
CS: Coefficient of scalability.
SSR: Scale score reliability.

*See ref. 53.

†Europe-American

Table 3. Estimated proportions of scale true types by origin group

origin	scale type									
	1		2		3		4		5	
	crude	adj	crude	adj	crude	adj	crude	adj	crude	adj*
	%		%		%		%		%	
Israeli	3	4	17	12	24	28	44	44	11	11
Eu. Am.†	3	5	36	37	31	32	23	19	6	6
Asian	5	5	33	33	44	44	16	16	2	2
N. African	1	1	23	16	32	32	31	36	13	14

*Adjusted according to Proctor procedure, ref. 53.

†Europe-American.

the adjustment had no effect on the Asian group. Examination of the distributions suggests that for the Israeli and North African groups there may be four underlying true types while for the Asian and Europe-Americans there may be only three underlying true types; i.e. score 1 is not a true type for any group and score 5 is not a true type for Europe-American and Asian groups.

Sociodemographic Relationships

Tables pertaining to these analyses appear in Appendix 5, beginning on page 129.

Effect of origin. As shown in Table 4, there was a highly significant effect of origin in the distribution of scale scores. For example, 10% of the Israeli male sample fell at or below score 2 while for Europe-American and Asians 42% and 46% respectively fell at or below score 2. Results were similar for the other age sex groups: Asian and Europe-Americans were clustered at the low end of the scale while Israeli and North Africans clustered at the upper end. This effect can be attributed to the differences in item response rates for the foods in the individual scales.

Effect of gender. (Table 5) The distribution of scale scores by gender was not significantly different for three of the four origin groups. For Israelis there was a greater proportion of females and a smaller proportion of males with score 2 than expected. The reverse occurred at score 5.

Effect of generation. (Table 6) There were no significant differences in the distributions of parents' and childrens' scale scores among Israelis and Europe-Americans. Among Asians, parents tended to cluster at the lower scale scores while their children clustered at the upper score levels. Among North Africans, there was a greater than expected concentration of parents and a smaller concentration of children at score 2.

Effect of age. (Table 7) For this and the following analyses all origin groups were combined using the two level index of dietary complexity as described in the methods section. Mean age was significantly lower for fathers in the high complexity category compared to those in the low complexity category (48.7 years vs 50.0 years). For mothers, there were no significant differences.

Effect of education. (Table 8) For these analyses education was measured as secular education and secular plus religious education for fathers and as secular education of self, secular and secular plus religious education of head of household for mothers. There were no significant differences in mothers' scale scores by mothers' education or by education of head of household. However for fathers education, measured either as secular or total, was significantly higher in the high complexity group.

Effect of occupation of head of household. (Table 9) This analysis was performed only for fathers since most of the heads of household were fathers. There were no significant differences in occupational status by complexity score.

Effect of immigration. (Table 10) Period of residence in Israel was not related to level of complexity.

Effect of household crowding. (Table 11) The crowding index was not related to level of complexity for either fathers, mothers or girls.

Among boys there was a borderline effect (p=0.0542). More boys fell into the high complexity category as crowding decreased.

Family Relationships

Tables for these analyses are contained in Appendix 5, beginning on page 131.

Comparison of spouse scale scores. Spouse scale scores were compared among spouses of the same origin groups (homogeneous) and spouses who differed in origin (non homogeneous). As shown in Table 12, scale scores were significantly positively correlated for homogeneous spouse pairs (R^2=0.0986, p=0.003), but not for non homogeneous pairs.

Comparison of parents' with childs' scale scores. (Table 13A) Fathers' scores were significantly positively correlated for Israeli fathers (R^2=.0991, p=.03); and for Europe-American fathers (R^2=.2523, p=.01). The overall relationship was highly significant (R^2=.0806, p=.002).

Unlike fathers' scores, mothers' scores were unrelated to those of their children. (Table 13B)

Effect of spouse status consistency. (Tables 14, 15) In the first analysis, all origin groups were combined and stratified on the basis of low or high dietary complexity level. Education was stratified into three levels: $<$high school, high school, $>$high school. Spouse pairs were then stratified on the basis of consistency of education. For both fathers and mothers there were no significant differences in complexity level. A similar analysis stratified mothers and fathers by Guttman scale score. Again educational consistency appeared to have little or no effect on scale score.

In a separate analysis, mothers and fathers were stratified into high and low complexity levels and then categorized on the basis of whether or not they belonged to the same origin group. There were no significant differences observed in complexity level when mothers or fathers were analyzed separately. A similar analysis, stratifying mothers and fathers by Guttman scale score did not show a significant effect of origin consistency. (Tables 16,17)

A four level status consistency index based on origin and education was used to test the effect of status consistency on scale score in analyses similar to those described above. (Tables 18,19) Again no significant effect was detected. Only when mothers and fathers were combined and the status index was collapsed into two levels did there appear to be a marginally significant effect (p=.0722). Among mothers and fathers of equal status there was a lower than expected number in the high complexity category whereas among mothers and fathers of unequal status there were greater than expected numbers in the high complexity category.

Nutrient Relationships

All nutrient tabulations by scale scores appear in Appendix 6, beginning on page 147. Selected nutrient relationships are displayed in figures in the text.

Energy. (Tables 20A to 20D) Energy intake for fathers ranged from a low of 1372 Kcal for North Africans with scale score 1 to a high of 3291 for Asians with score 5. Energy intake was highly significantly related to scale score for fathers in three of the four origin groups (p=.0001). The relationship in Europe-Americans was borderline (p=0.0531). In all origin groups, energy intake increased with scale score (Fig. 3A). Similar trends were observed for boys ranging from 1714 Kcal at score 1 to 3783 at score 5, however the relationship was significant only for Asian boys. (Fig. 3B) For mothers, energy intake ranged from 1011 to 2591 and was significantly positively related to scale score for Israelis and Asians (p=.0001) (Fig. 3C). Energy intake for girls ranged from 763 Kcal to 3734 Kcal and was significantly positively related to scale score for three of four origin groups. North Africans were borderline (p=.0759) but exhibited the same trend. (Fig. 3D)

Mean energy intakes were similar across origin groups for fathers. For boys, mean energy intakes were slightly higher among the Israeli and Europe-Americans. For mothers, the lowest energy intakes were observed in the North African group while mean energy intake was slightly higher for Europe-American girls compared to the other origin groups.

Energy intake per kilogram body weight also tended to increase with scale score (Figs. 4A to 4C). This relationship was significant for three of four origin groups for fathers (Israeli, Asian and North African) but only for Asians among the boys (Tables 21 A,B). For women, it was significant for Israeli and Asian mothers and all four origin groups for girls. Intakes ranged from 19 to 48 Kcal/Kg for fathers and from 26 to 58 Kcal/Kg for boys. Women's intakes ranged from 16 to 42 Kcal/Kg for mothers and from 14 to 61 Kcal/Kg for girls. Mean group intakes were slightly lower for Europe-American fathers, and slightly higher for Europe-American boys compared to the other origin groups.

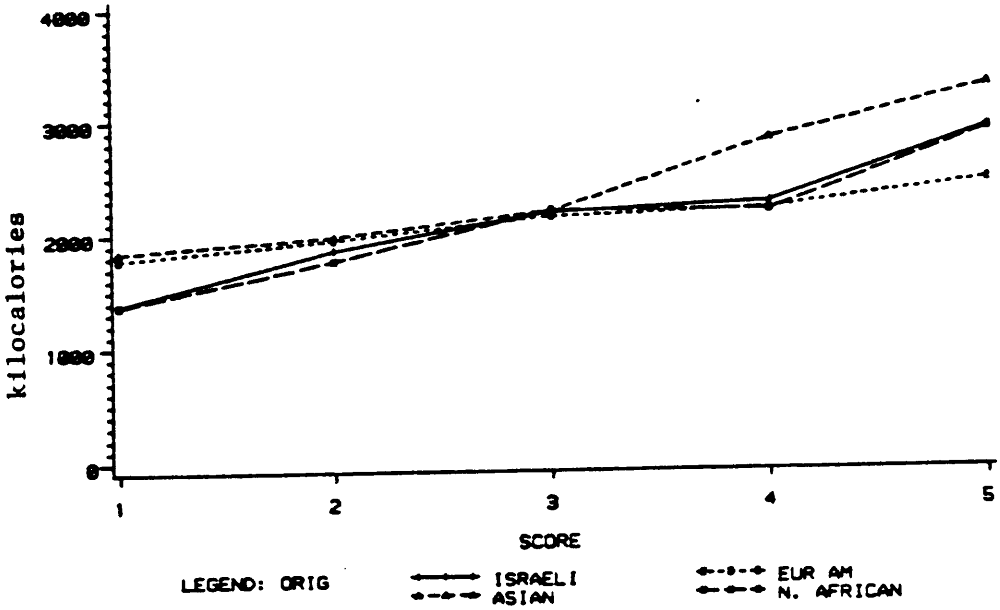


Fig. 3A Mean Energy Intake by Guttman Scale Score for Fathers (Table 20A)

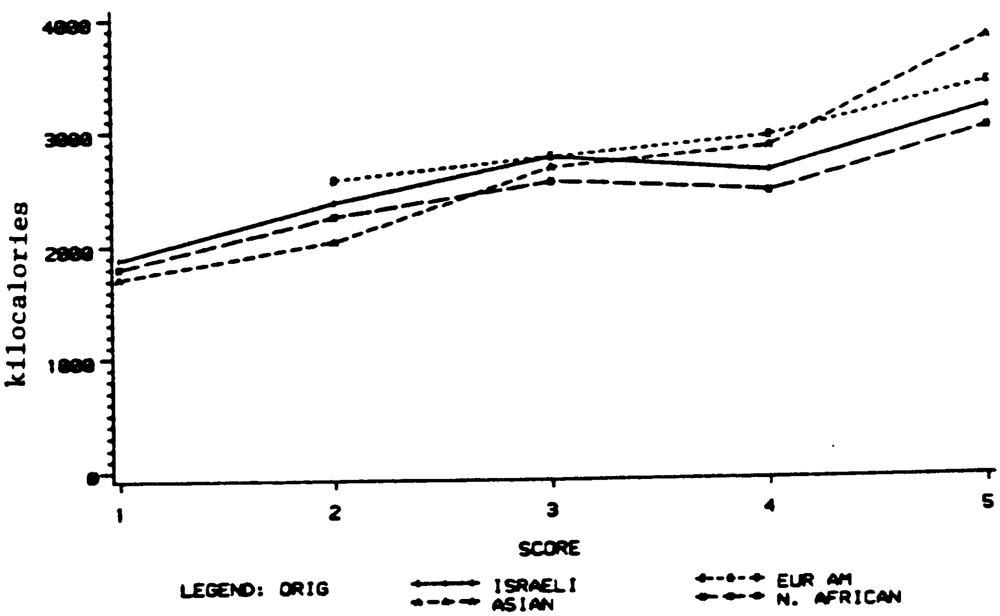


Fig. 3B Mean Energy Intake by Guttman Scale Score for Boys (Table 20B)

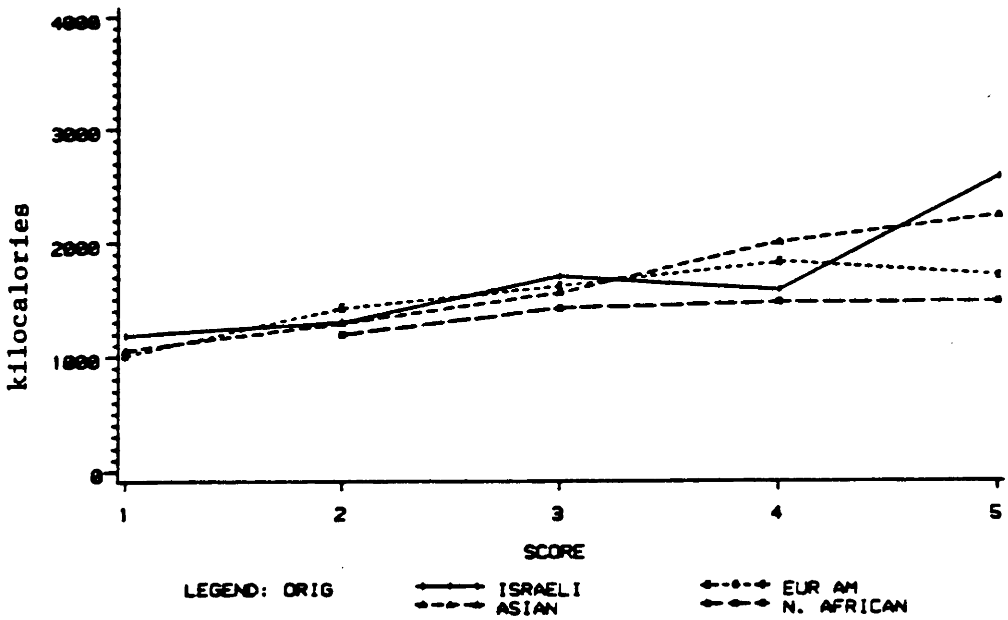


Fig. 3C Mean Energy Intake by Guttman Scale Score for Mothers (Table 20C)

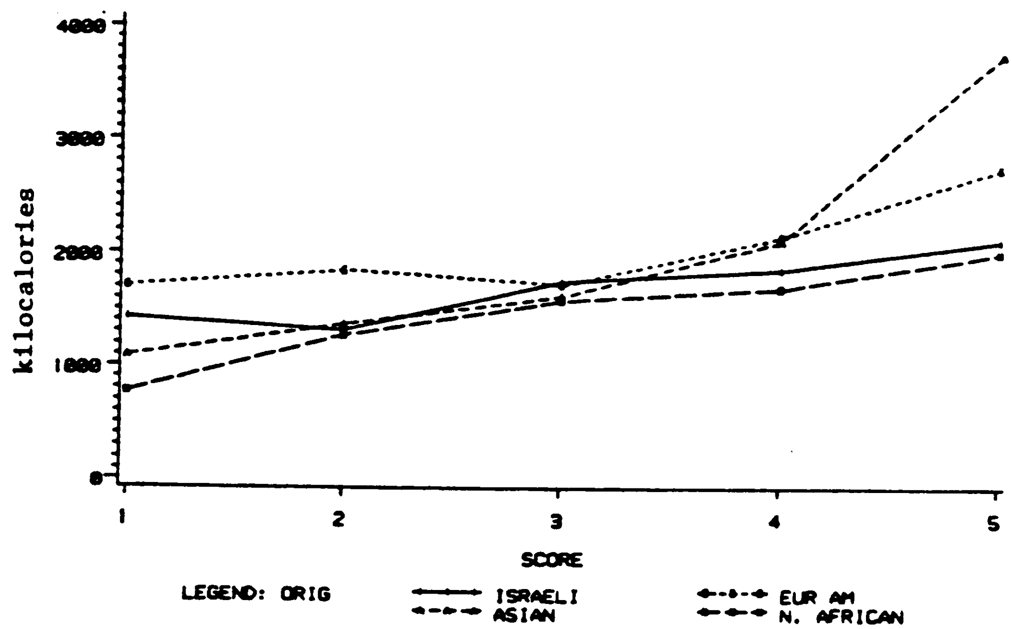


Fig. 3D Mean Energy Intake by Guttman Scale Score for Girls (Table 20D)

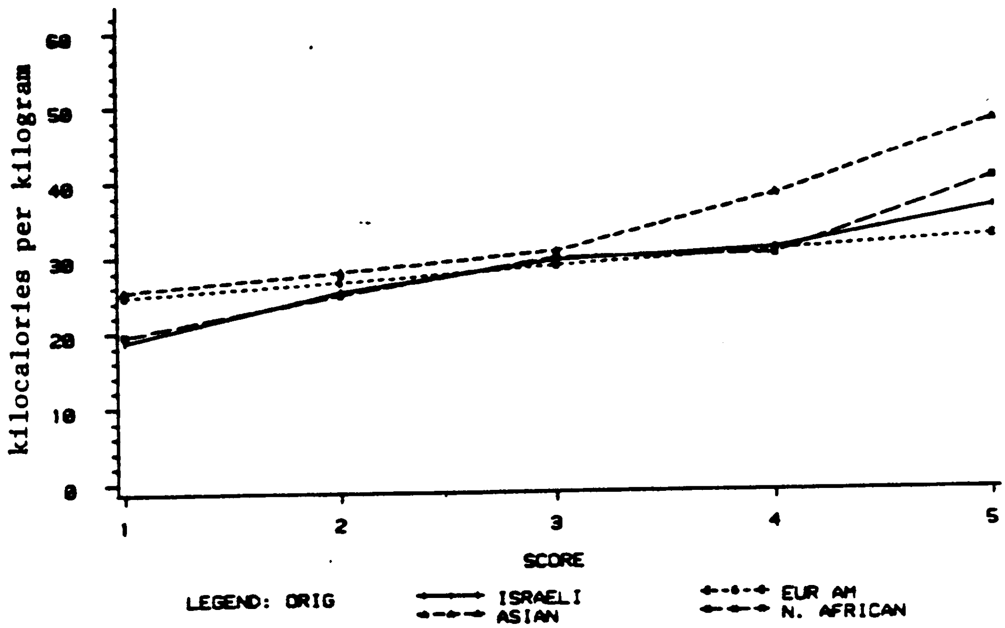


Fig. 4A Mean Energy per Kilogram Body Weight by Guttman Scale Score for Fathers (Table 21A)

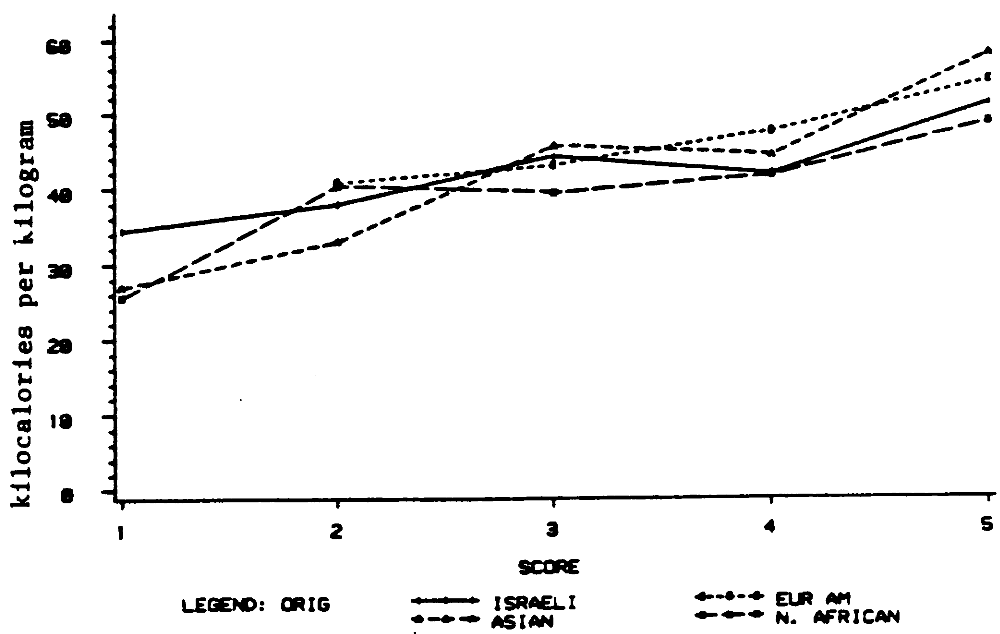


Fig. 4B Mean Energy per Kilogram Body Weight by Guttman Scale Score for Boys (Table 21B)

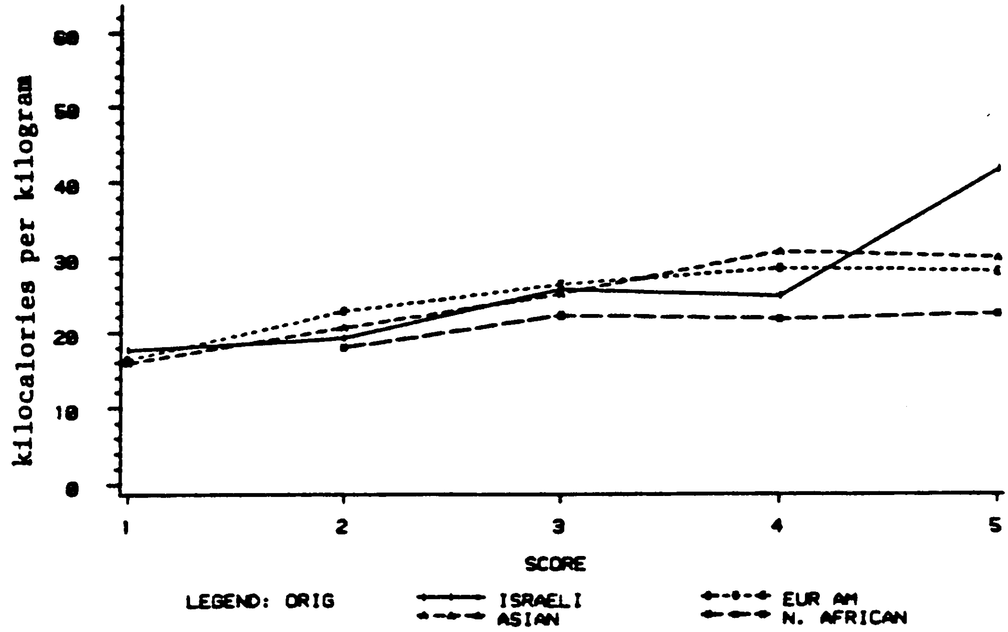


Fig. 4C Mean Energy per Kilogram Body Weight by Guttman Scale Score for Mothers (Table 21C)

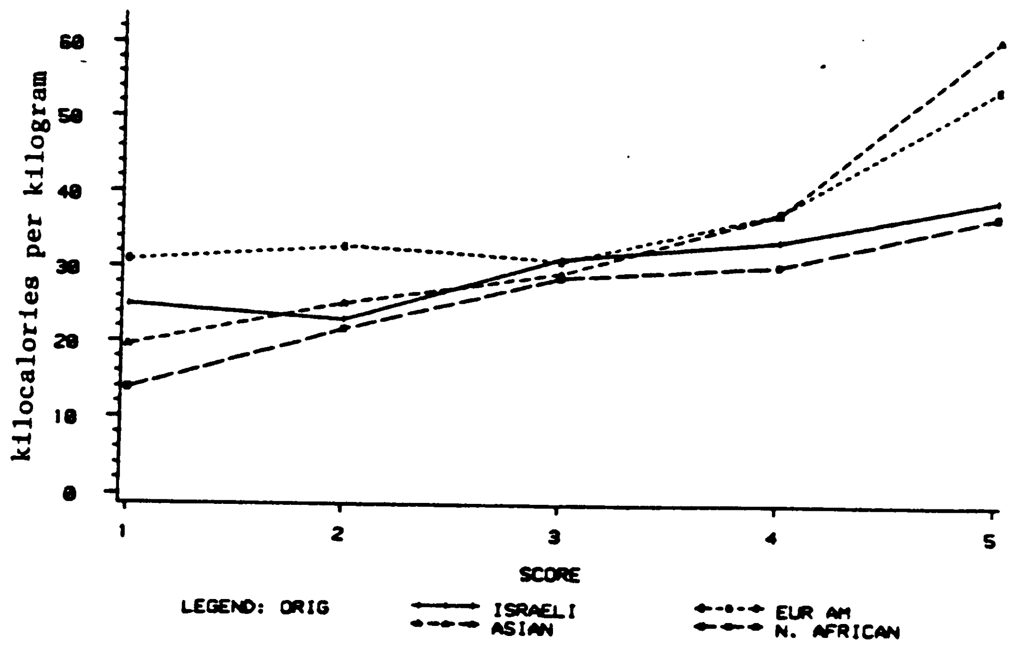


Fig. 4D Mean Energy per Kilogram Body Weight by Guttman Scale Score for Girls (Table 21D)

For both mothers and girls group mean intakes were lowest in the North African group. (Tables 21 C,D)

Protein. (Tables 22A to 22D) Protein intake as percent of energy ranged from 10% to 16% for fathers, 9% to 15% for boys, 12% to 16% for mothers and from 9% to 15% for girls. Although significant differences by scale score were observed among Israeli, Asian and North African fathers, Israeli and Asian boys, Asian mothers and Asian daughters, there were no clear trends observed. Overall group mean intakes were similar across all origin groups.

Fat. (Tables 23A to 23D) Fat contributed 19% to 42% of energy for fathers, 26% to 41% for boys, 20% to 40% for mothers and 20% to 41% for girls. Significant differences in fat intake were observed for all four origin groups among fathers. As shown in figures 5A to 5D, there was a trend toward increasing fat intake as scale score increased except among Israeli fathers, where the highest values occurred in the extreme scores. Similar trends toward increased fat intake were observed among boys, mothers and girls but the differences were significant only among North Africans (boys), Europe-Americans (mothers) and Asians (mothers, girls).

For fathers and boys group mean fat intakes tended to be lowest among Asians and North Africans. For women the group means were similar across origin groups.

Saturated fat. (Tables 24A to 24D) Saturated fat as percent of energy ranged from 7% to 15% for fathers, 8% to 12% for boys, 8% to 13% for mothers and 8% to 13% for girls. Saturated fat intake did not differ significantly by scale score for any origin groups except among

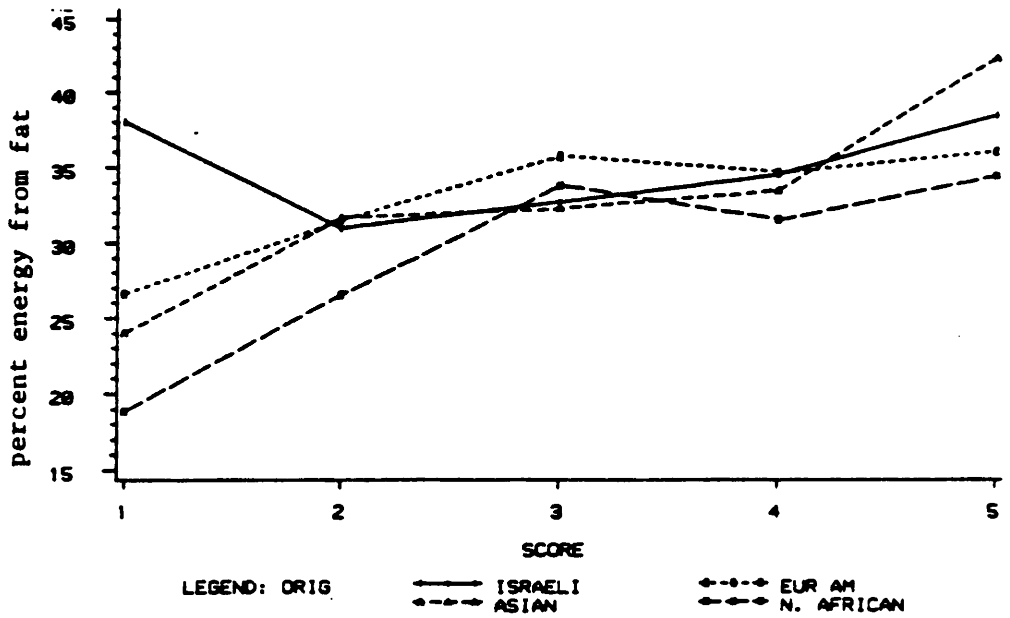


Fig. 5A Mean Percent Energy from Fat by Guttman Scale Score for Fathers (Table 23A)

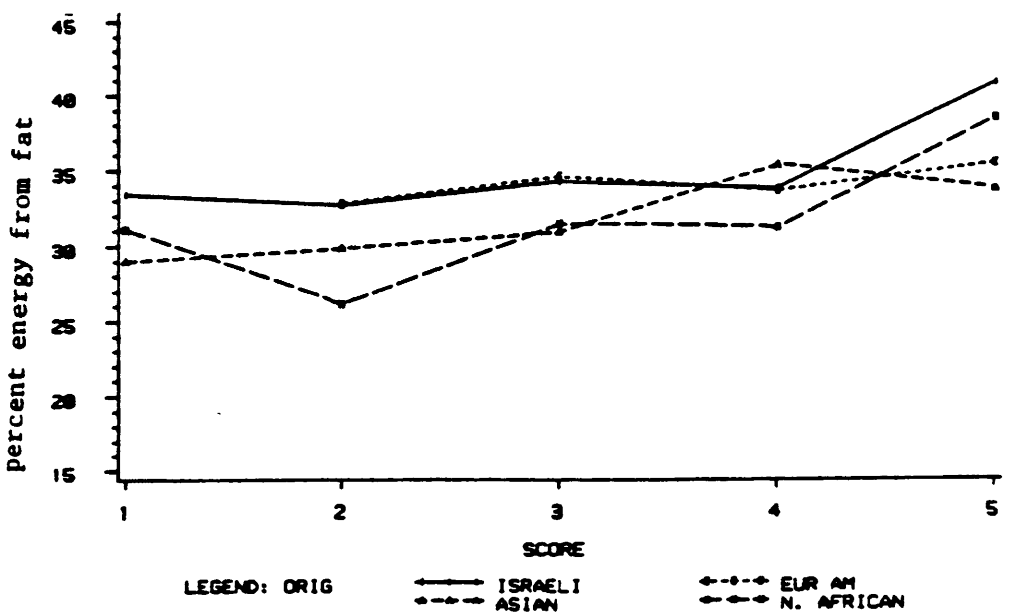


Fig. 5B Mean Percent Energy from Fat by Guttman Scale Score for Boys (Table 23B)

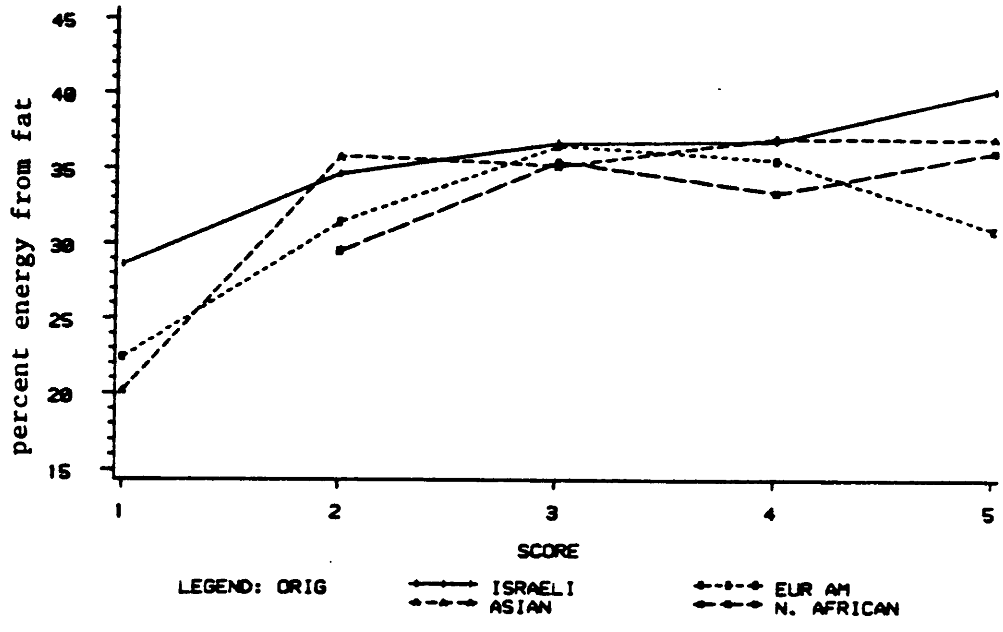


Fig. 5C Mean Percent Energy from Fat by Guttman Scale Score for Mothers (Table 23C)

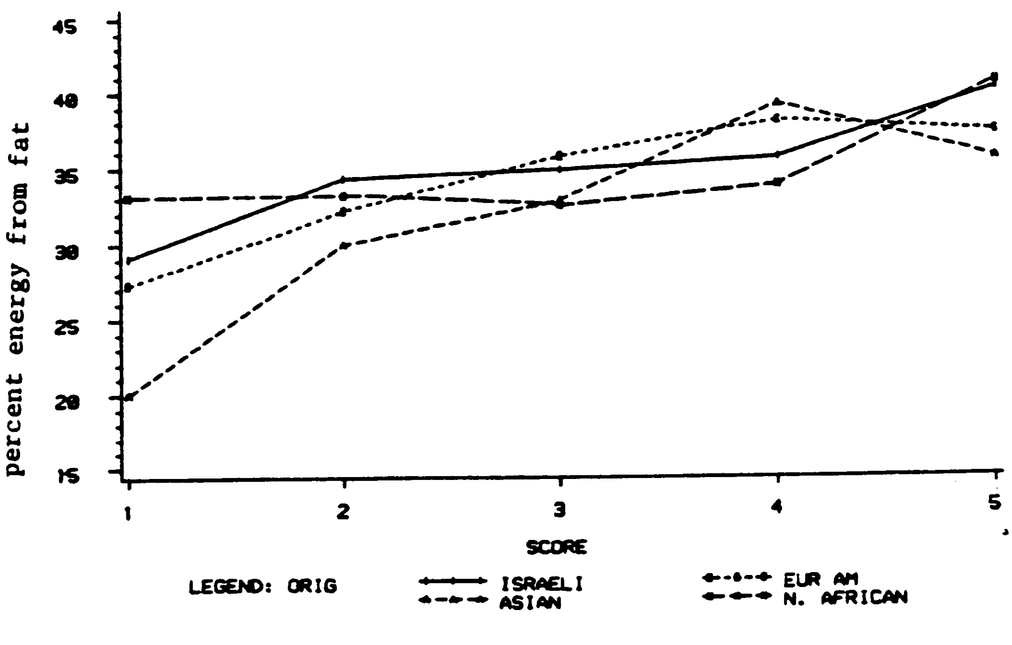


Fig. 5D Mean Percent Energy from Fat by Guttman Scale Score for Girls (Table 23D)

Israeli and Europe-American fathers and Europe-American boys. Unlike total fat, there were no discernible trends by scale score for saturated fat. Group mean intakes were lowest among North Africans and Asians.

Monounsaturated fat. (Tables 25A to 25D) Percent of energy supplied by monounsaturated fat (ranging from 4% to 16% for fathers, 8% to 14% for boys, 6% to 15% for mothers and 7% to 14% for girls) was significantly related to scale score for Israeli, European and North African fathers, North African boys, Asian mothers and girls ($p < .05$). There appeared to be a slight trend toward increasing monounsaturated fat intake with increasing scale score for all four origin groups among fathers; Israeli and North African boys; Israeli mothers; and Israeli, Europe-American, Asian and North African girls.

Polyunsaturated fat. (Tables 26A to 26D) Polyunsaturated fat intake as percent of energy ranged from 3% to 11% for fathers, 7% to 14% for boys, 3% to 13% for mothers and from 2% to 13% for girls. Significant differences by scale score were observed for Asian and North African fathers, boys, and mothers and for Israeli and Asian girls. Among Israeli, Asian and North African fathers, Asian boys, and Israeli, Asian and North African mothers there was a slight trend toward higher intakes at higher scale scores as shown in figures 6A to 6D. Mean intakes were similar across origin and sex groups.

Ratio of polyunsaturated to saturated fat (P/S). (Tables 27A to 27D) The P/S ratio ranged from 0.3 to 1.2 for fathers, 0.7 to 2.4 for boys, 0.5 to 1.6 for mothers and from 0.4 to 1.3 for girls. Significant

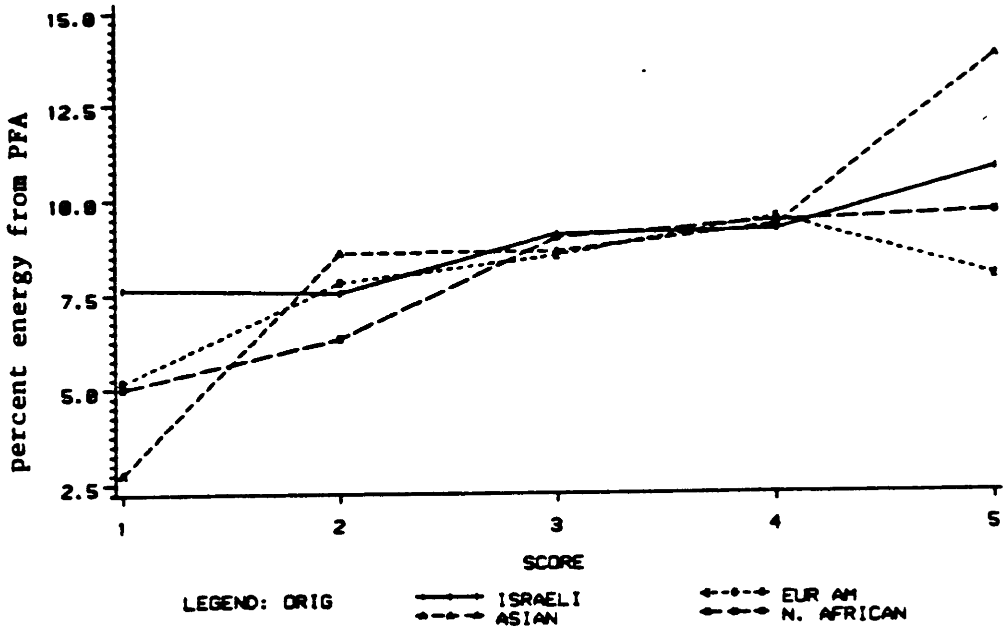


Fig. 6A Mean Percent Energy from Polyunsaturated Fat (PFA) by Guttman Scale Score for Fathers (Table 26A)

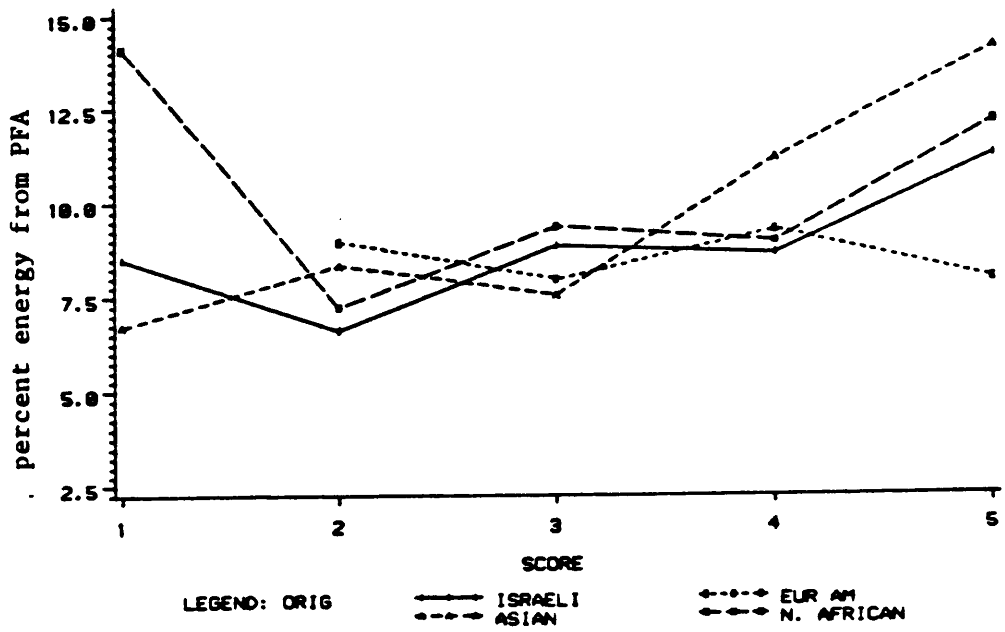


Fig. 6B Mean Percent Energy from Polyunsaturated Fat (PFA) by Guttman Scale Score for Boys (Table 26B)

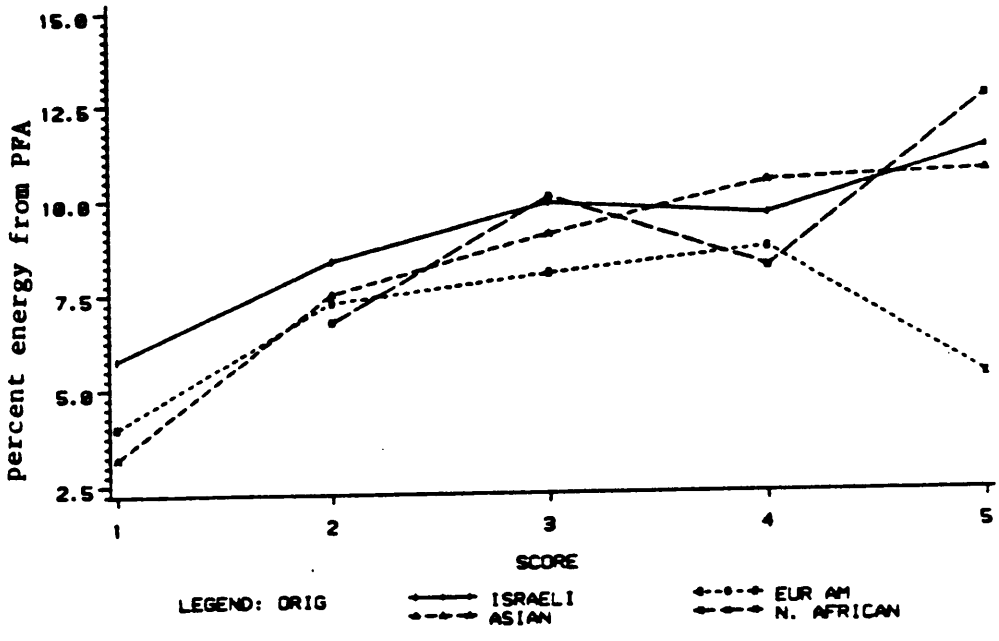


Fig. 6C Mean Percent Energy from Polyunsaturated Fat (PFA) by Guttman Scale Score for Mothers (Table 26C)

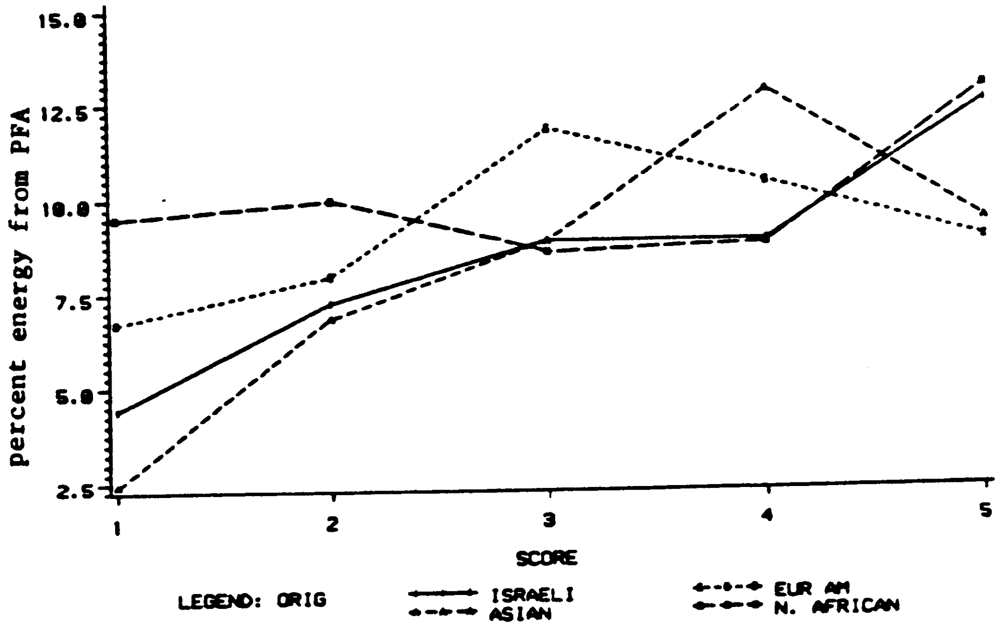


Fig. 6D Mean Percent Energy from Polyunsaturated Fat (PFA) by Guttman Scale Score for Girls (Table 26D) differences by scale score were observed for Asian fathers, Europe-American, Asian and North African boys, North African mothers and Israeli and Asian girls ($p < .05$). There appeared to be a slight trend toward higher P/S ratios for Israeli and North African fathers with increasing complexity of diet, while for Europe-American and Asian fathers the relationship was inverted U shaped. Significant differences were found among Europe-American, Asian and North African boys. There was a slight suggestion of a trend toward higher P/S in the higher scale scores. A similar borderline trend ($p=.0528$) was detected among Asian mothers. Israeli and North African girls showed increasing P/S ratios with scale score but for Europe-American girls the relationship was inverted U shaped. Mean P/S ratios varied across sex and origin groups. P/S ratios were highest among Israeli fathers, North African mothers and Asian and North African girls.

Cholesterol. (Tables 28A to 28D) Dietary cholesterol intake ranged from 42 mg to 887 mg for fathers, 49 mg to 886 mg for boys, 65 mg to 542 mg for mothers and 65 mg to 649 mg for girls. Significant differences by scale score were observed in all sex origin groups except Asian mothers and girls. In general, the trend was toward higher cholesterol intakes with higher scale scores (figures 7A to 7D). This trend becomes clear if one compares cholesterol intakes above and below the median scale score. In every group the cholesterol intake is lower below the median scale score. Mean cholesterol intakes were lower for Asians and North Africans across all sex origin groups.

Carbohydrate. (Tables 29A to 29D) Percent of energy from carbohydrate ranged from 44% to 64% among fathers, 45% to 60% among

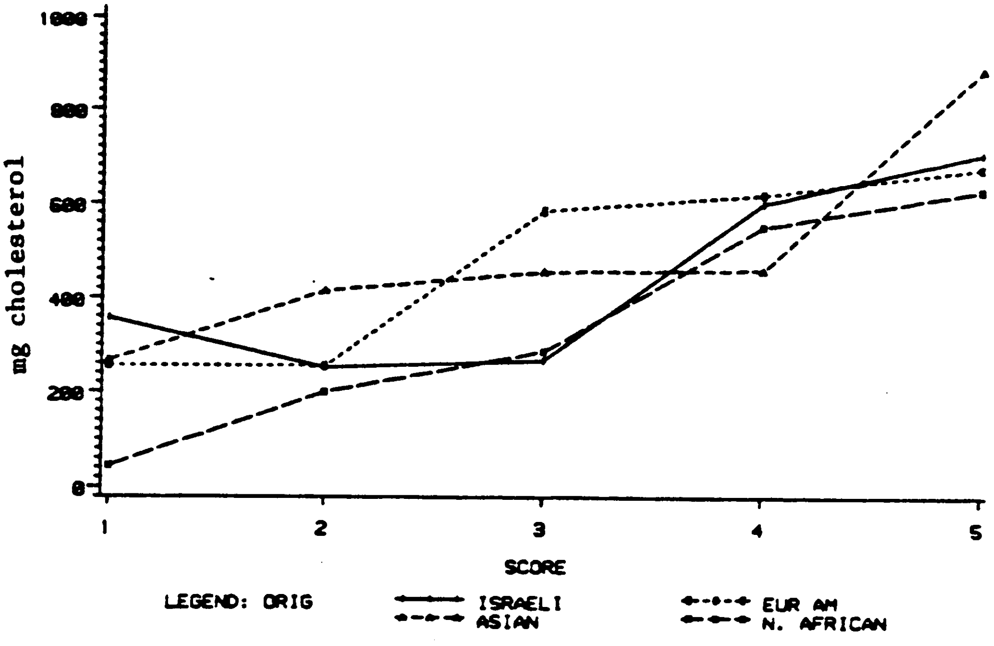


Fig. 7A Mean Dietary Cholesterol Intake by Guttman Scale Score for Fathers (Table 28A)

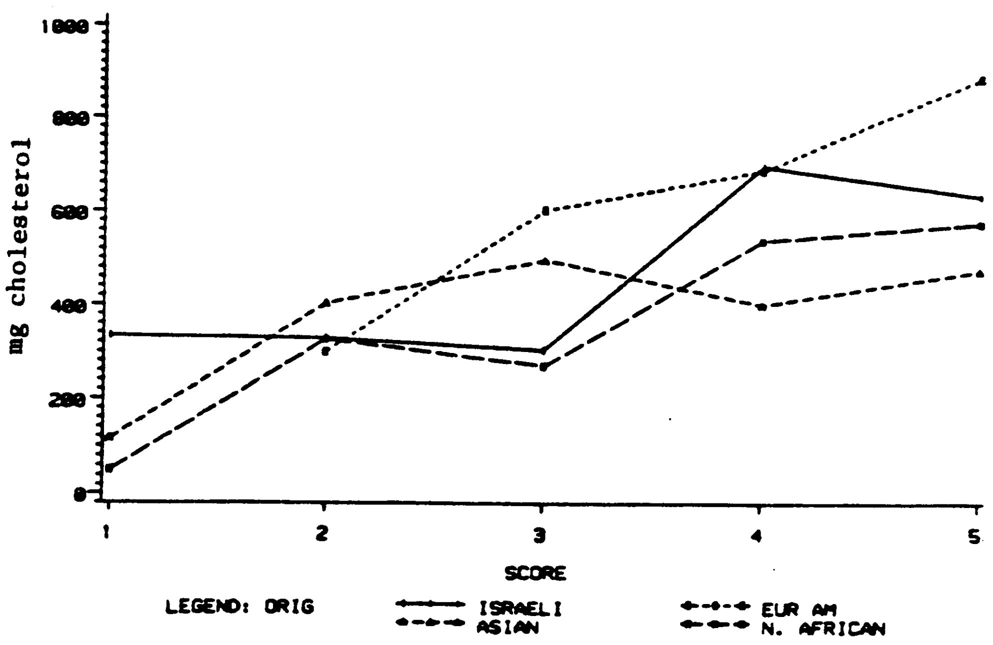


Fig. 7B Mean Dietary Cholesterol Intake by Guttman Scale Score for Boys (Table 28B)

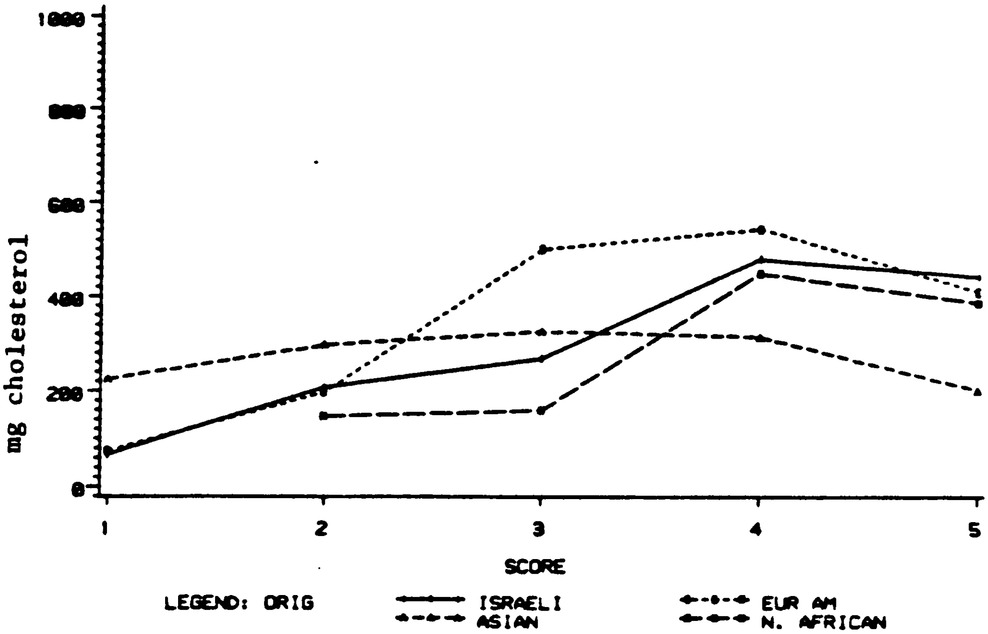


Fig. 7C Mean Dietary Cholesterol Intake by Guttman Scale Score for Mothers (Table 28C)

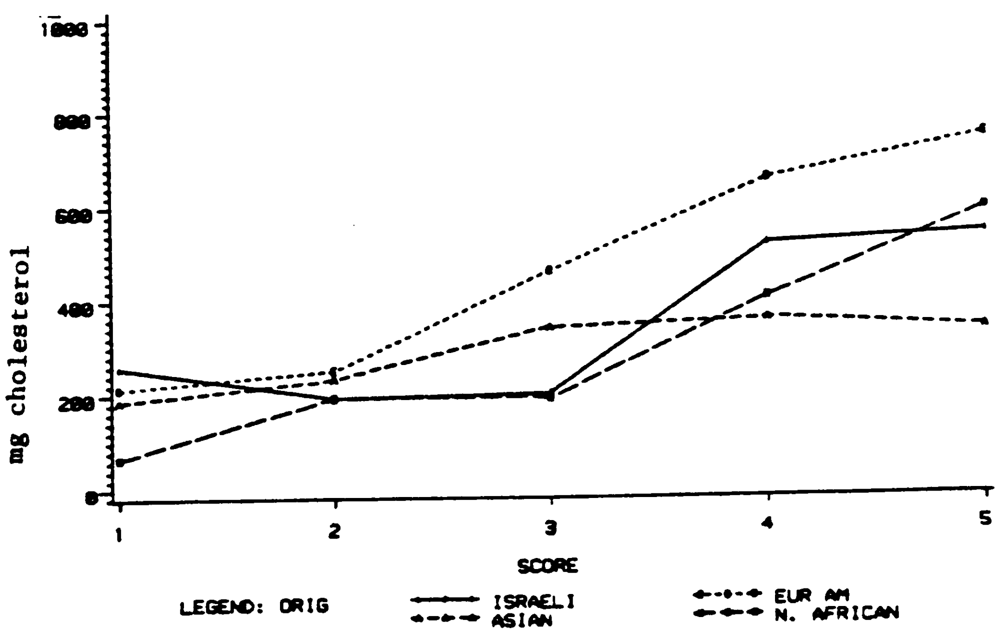


Fig. 7D Mean Dietary Cholesterol Intake by Guttman Scale Score for Girls (Table 28D) boys, 46% to 66% among mothers and 46% to 65% for girls. As shown in figures 8A to 8D, there was a slight trend among fathers for carbohydrate intake to decrease as scale score increased, but the differences were significant only for Europe-Americans and North Africans. ($p < .01$). Similar trends were observed for Israeli ($p = .06$) and North African boys ($p < .01$). Among Israeli and Asian mothers carbohydrate intake decreased with increasing scale score but the differences were not significant. Among North African girls there was a trend toward lower carbohydrate intake at higher scale scores ($p < .05$). A similar but non significant difference was observed for Israeli girls. Among Europe-American and Asian girls the results tended to be U shaped. ($p < .05$).

Starch. (Tables 30A to 30D) Starch intake as percent of total energy ranged from 19% to 34% among fathers, 24% to 46% among boys, 18% to 34% among mothers and 20% to 34% among girls. Among North African fathers starch intake was lower in the upper scale scores ($p < .01$); among Israeli fathers the relationship was inverted U shaped ($p < .01$). There were no significant differences among the Europe-American and Asian fathers (Fig. 9A). Israeli, Asian and North African boys had lower starch intakes in the higher scale scores; the differences were significant for Asian and North Africans ($p < .01$)(Fig. 9B). Among Israeli and European mothers the highest starch intakes were observed at scale score 1 ($p < .05$). However, the sample sizes in these score levels were extremely small. Among Asian mothers there was a non significant U shape relationship and among North Africans there appeared to be a decrease in starch intake as scale score increased, although the

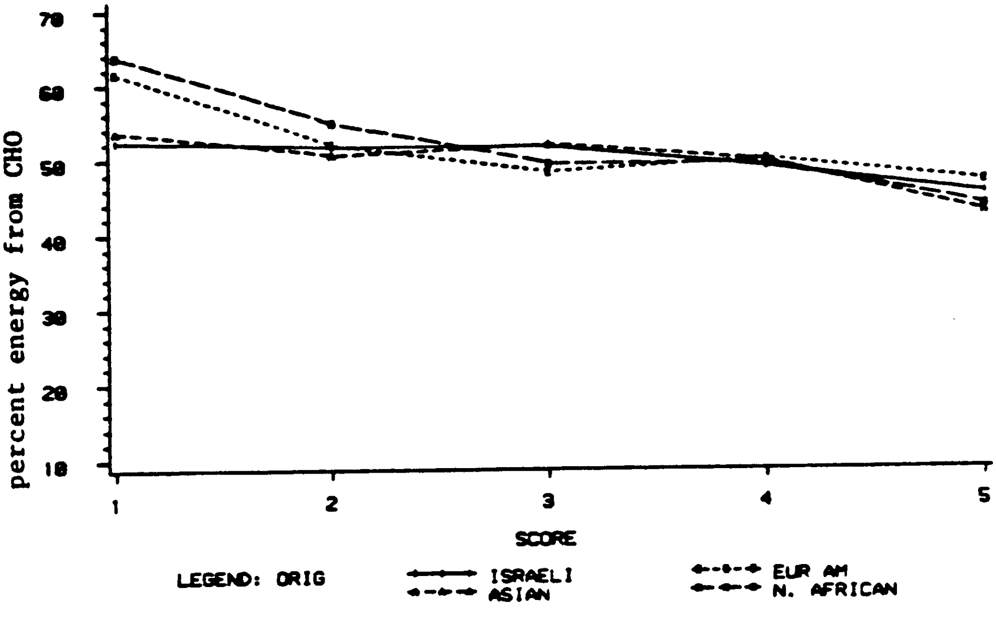


Fig. 8A Mean Percent of Energy from Carbohydrate (CHO) by Guttman Scale Score for Fathers (Table 29A)

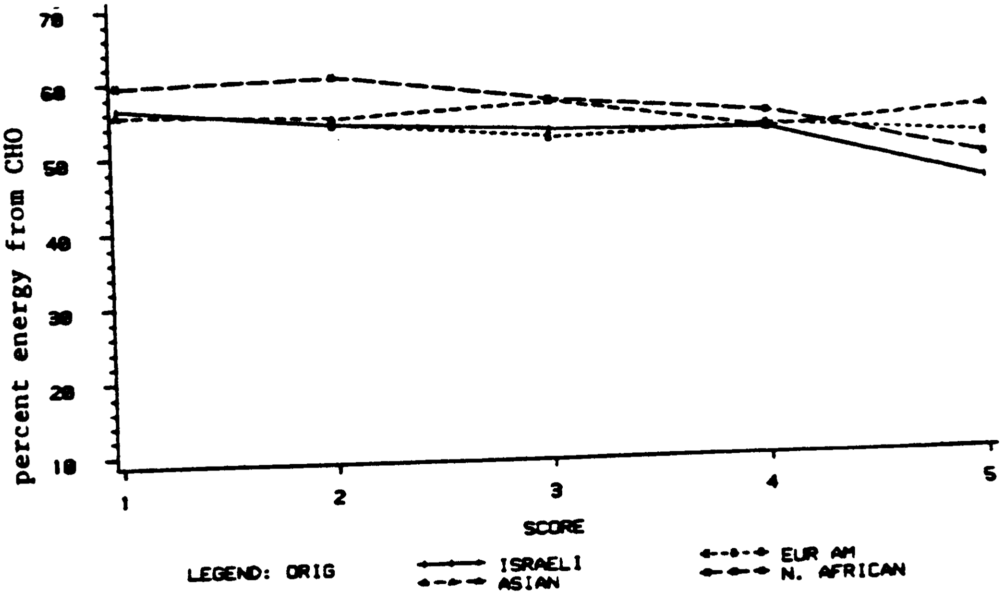


Fig. 8B Mean Percent of Energy from Carbohydrate (CHO) by Guttman Scale Score for Boys (Table 29B)

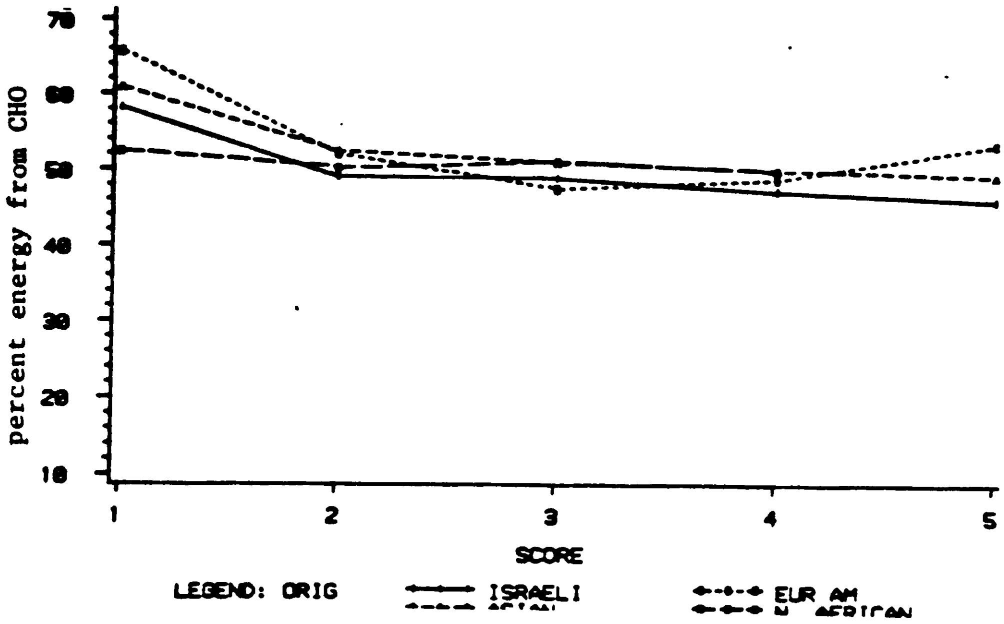


Fig. 8C Mean Percent of Energy from Carbohydrate (CHO) by Guttman Scale Score for Mothers (Table 29C)

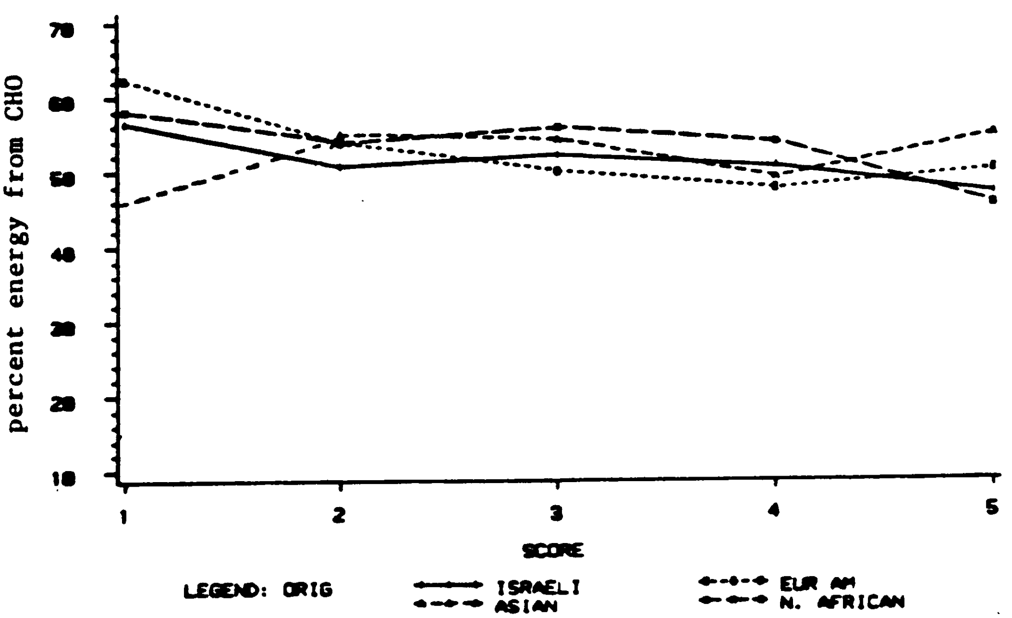


Fig. 8D Mean Percent of Energy from Carbohydrate (CHO) by Guttman Scale Score for Girls (Table 29D)

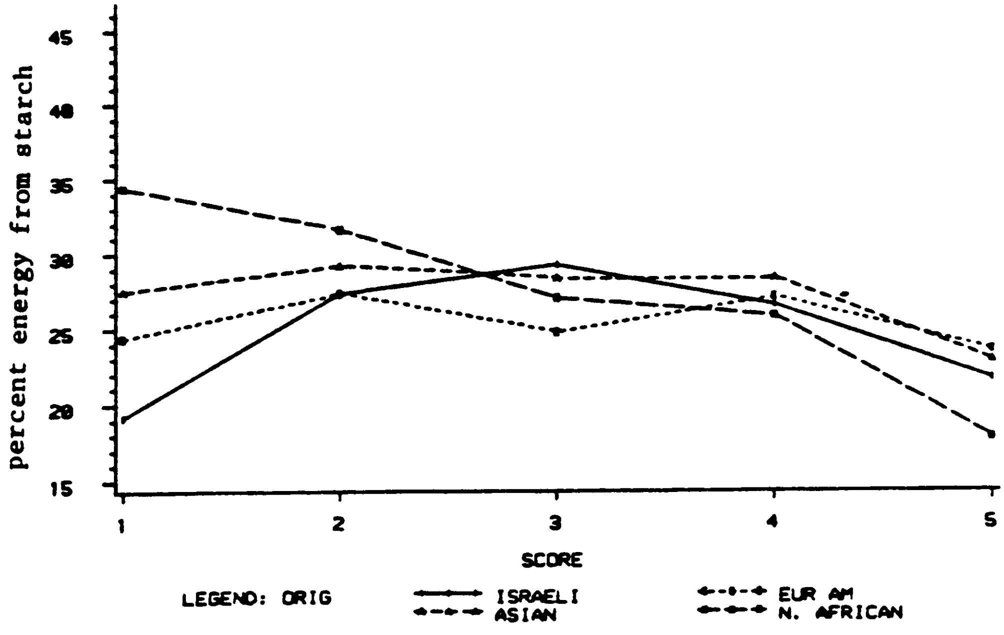


Fig. 9A Mean Percent of Energy from Starch by Guttman Scale Score for Fathers (Table 30)

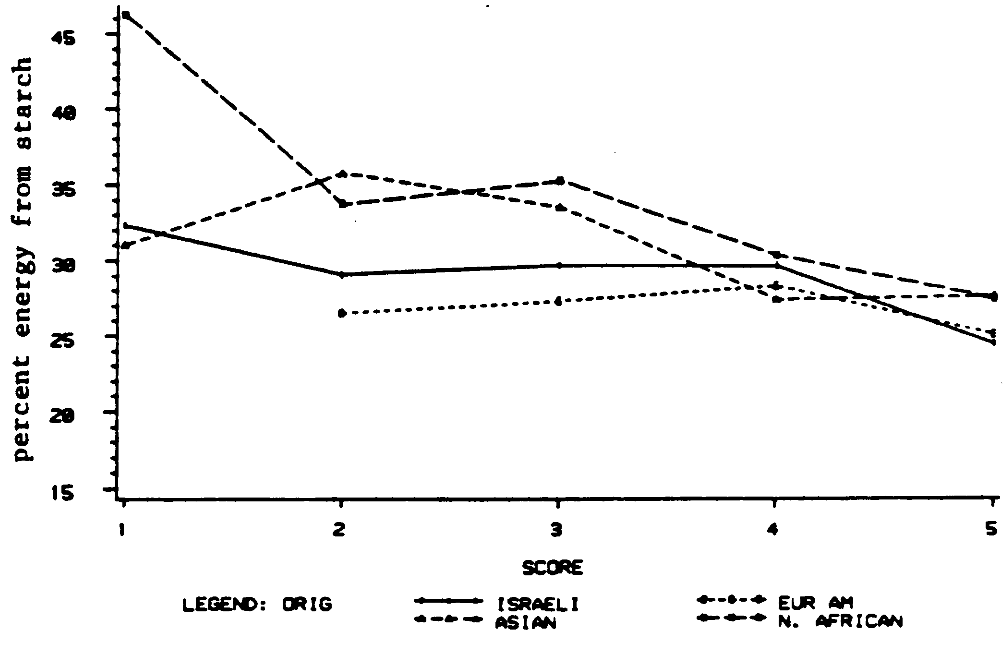


Fig. 9B Mean Percent of Energy from Starch by Guttman Scale Score for Boys (Table 30B) differences were marginally significant (Fig. 9C). Among girls there also appeared to be a decrease in starch intake as scale score rose, but the differences were not significant (Fig. 9D). Overall mean starch intake was slightly higher among Asian fathers compared to the other origin groups. Asian and North African boys had mean starch intakes higher than Israeli and Europe-American boys; Europe-American mothers and girls had lower mean starch intakes than Israeli, Asian and North African mothers and girls.

Sugar. (Tables 31A to 31D) Mean sugar intake as percent of total energy ranged from 8% to 14% among fathers, 10% to 19% among boys, 9% to 18% among mothers and 6% to 24% among girls. There were no significant differences by scale score and no trends were observed. Overall, mean sugar intake was highest among North African boys and girls.

Other carbohydrate. (Tables 32A to 32D) Other carbohydrate (primarily excluding starch and refined sugar) accounted for 10% to 24% of total energy among fathers, 6% to 20% among boys, 12% to 20% among mothers, and 6% to 24% among girls. Europe- Americans had the highest mean intakes. There were no significant differences in intake of other carbohydrates by scale score except for Europe-American fathers and Asian girls, both of which had the highest mean values at scale score 1, and North African boys who exhibited an inverted U shape. Overall, consumption of other carbohydrates was highest among Europe-Americans.

Alcohol. (Tables 33A to 33D) Alcohol intake as percent of energy ranged from 1% to 9% among fathers, 0% to 2% among boys, 0% to 3% among mothers and 0% to 0.2% among girls. There were no significant

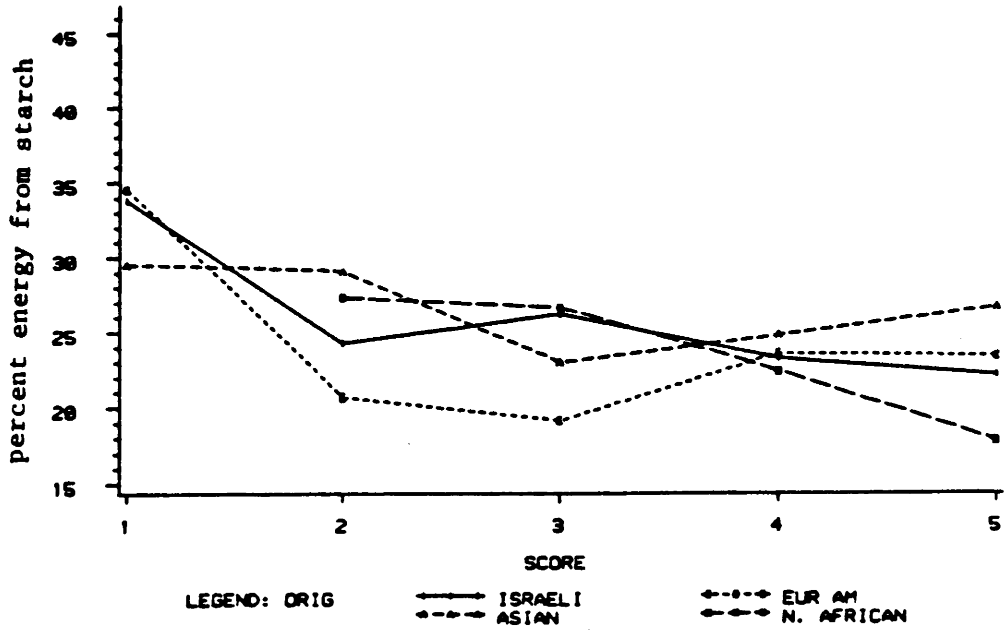


Fig. 9C Mean Percent of Energy from Starch by Guttman Scale Score for Mothers (Table 30C)

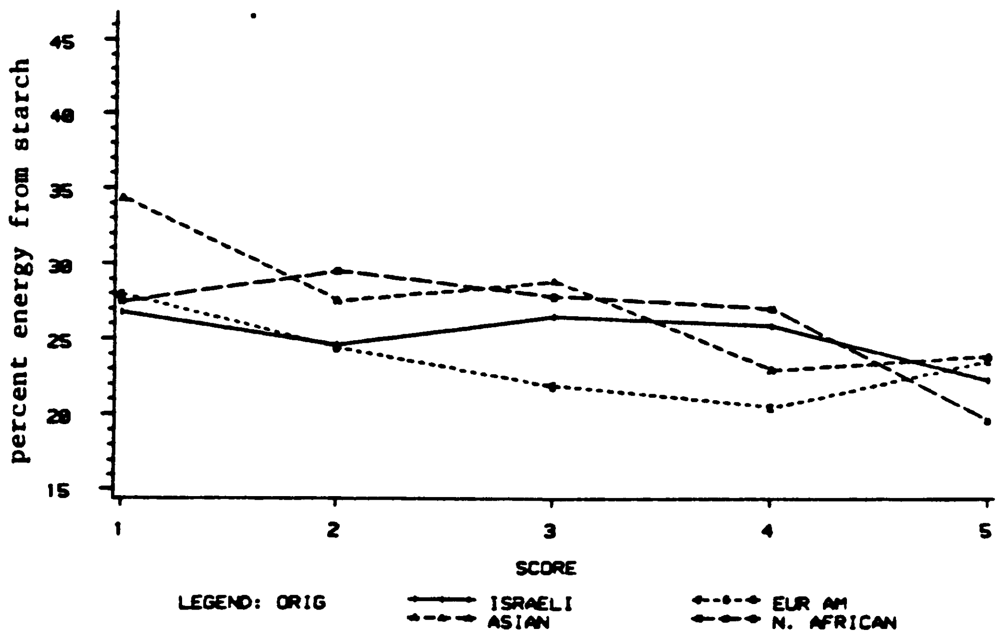


Fig. 9D Mean Percent of Energy from Starch by Guttman Scale Score for Girls (Table 30D) differences by scale score. Overall mean alcohol intake was highest for North African fathers, boys and mothers and for Europe-American and North African girls.

Workday status. (Tables 34A to 34D) Dietary complexity was significantly related to workday status for fathers (p=.0000), mothers (p=.0002) and girls (p=.0017). A greater than expected frequency of high complexity dietary recalls were found in the day off category compared to workdays. Among boys this relationship was not observed. However when participants were stratified by Guttman scale score (Tables 35A to 35D), all four groups combined had higher scale scores on days off.

Health Status

The following health status indices were examined as dependent variables in relation to dietary complexity indices used as independent variables. Tables are shown in Appendix 7, beginning on page 212.

Quetelet index. The effect of dietary complexity on Quetelet Index was examined by comparing mean Quetelet index in high and low complexity groups for mothers, fathers, boys and girls. As shown in Table 36, no significant differences were observed in any of the groups examined. A similar analysis using Guttman scale scores as the independent variable also revealed no significant effect except among North African boys (p.0029). There were no clear trends, however and this finding may be due to chance (Table 37A to 37D).

Blood pressure. (Tables 39A-40D) Diastolic and systolic blood pressure in high and low complexity groups were compared for fathers, mothers, boys and girls separately. As shown in Tables 38A to 38B, no significant differences were observed. Similar analyses using Guttman scale scores as the index of complexity likewise revealed no significant differences except among North African girls (p.0309). Scale score 1 mean blood pressure was 12 to 17 mmHg higher than mean pressures for the other scale scores; however scale score 1 only had a sample size of 2.

Plasma cholesterol. The effect of dietary complexity on plasma cholesterol was examined because of the observed relationships of dietary complexity with nutrient intake. In the first analysis, fathers, mothers, boys and girls were stratified into high and low complexity groups and mean plasma cholesterol concentrations compared. As shown in Table 41, significant differences were observed for fathers; plasma cholesterol was higher in the high complexity group (206 mg/dl vs 197 mg/dl).

In a second analysis, Guttman scale scores were used as the independent variable. No significant differences were observed nor was there any discernible pattern in mean cholesterol values. (Tables 42A to 42D)

Alcohol use. As described in the Methods section, this analysis was formulated to test whether there were any differences in secular drinking patterns associated with dietary complexity.

In the first analysis fathers, mothers, boys and girls were stratified into "user" and "non user" groups. Users were defined as reporting consumption of alcoholic beverages other than wine during the previous week. Proportions of users were compared by high and low complexity level (Table 43) and across Guttman scale scores (Table 44). No significant differences were observed except among scale scores for boys (p=.0326). The percent of users was higher than expected at scale score 1 (47% vs. 33%) and lower than expected at scale score 5 (24% vs. 33%. Among non users, the reverse was observed (53% and 76% vs. 67%). This trend was not observed in other groups.

In a second analysis the frequency of consumption of beer, spirits and cordials was compared among fathers, mothers, boys and girls by two levels of dietary complexity, (Table 45). No significant differences in mean number of drinks of the different type beverages were observed.

Smoking status. Cigarette use was first evaluated by comparing the proportions of current, ex-smokers (less than 2 years) and non-smokers (including ex-smokers longer than 2 years) in low and high complexity groups for fathers, mothers, boys and girls. No significant differences in the distributions were observed (Table 46). In a second analysis, mean number of cigarettes smoked by current smokers was compared by high and low complexity level. Again, no significant differences were observed (Table 47).

Summary of Results

In summary it can be said that the scales achieved in this exploratory study are best termed quasi scales. Univariate analyses of scale ranks with other variables showed a significant negative association with age and positive association with education for fathers. Spouse scale scores were significantly correlated for homogeneous pairs but not for nonhomogeneous pairs. Overall, fathers' complexity scores were associated with those of their children; but for mothers and Asian and North African fathers, there was no apparent relationship.

Dietary correlates of complexity were primarily fat, cholesterol and energy (positive), starch and carbohydrate (negative).

Except for fathers' plasma cholesterol, health and behavioral variables did not appear to be related to dietary complexity as measured in this study.

DISCUSSION

The purpose of this investigation was to explore the feasibility of developing a valid system for ranking individuals on a single dimension (differentiation) based on 24 hour dietary recall data. Guttman scalogram analysis was selected because it scales both individuals and food items in a cumulative manner. If a representative selection of the universe of items has been selected and the food items form a scale then it can be assumed that a single dimension has been tapped.

The crude scales did not reach conventional standards of reproducibility and scalability and thus could not reliably predict food intake on the basis of scale score. However, since the intent of this investigation was to rank individuals on the basis of differentiation, and not to predict food intake, the quasi scales were deemed a sufficient basis for continuing the study (3). The Proctor adjustment resulted in acceptable scales for all origin groups except the Asian scale, which remained borderline.

In the present study, the twelve items initially used in each Guttman procedure did not form a scale. Maximum improvement was attained only when the items were reduced to 5. Armstrong has reported similar findings (22). In the process of elimination, food items were eliminated because they were either too error prone or poorly correlated with the scale. According to scalogram theory, non scalable items do not belong to the dimension measured. Thus they did not belong to the universe of attributes being measured. In fact, only five items from a large variety of items approached a scalable dimension. The Guttman procedure has been criticized for a tendency to produce scales covering a very narrow dimension because larger areas often do not scale (55).

It could be argued that since the underlying taxonomy for food classification was to a great extent arbitrary and investigator determined, the true classification upon which behavior is modulated is obscured. The problem was compounded in the present study because the recall responses were initially coded into a compressed number of food categories that were based primarily on fat, fatty acid, cholesterol, sugar and starch content. Moreover, subtle differences that characterize complexity, such as cooking method and flavoring components, were not retrievable.

A more serious problem is probably the use of a single 24 hour recall, since this period places a severe restriction on how much of the individual's universe of items that can be reported. Not only is it limited by biological capacity to ingest, it is also limited by seasonal availability. Daily variability in nutrient intake is well recognized. The shortcomings of the 24 hour recall in characterizing an individual's habitual intake have been widely reported (56-58); however there is a paucity of reports in the literature concerning intraindividual variability in food patterns.

One day food intake records have been used most successfully in studies in less developed countries where food resources are more restricted and tradition bound than in highly mobile industrialized societies. In the former case, one day may be more representative of habitual intake than in the latter. For example, Sanjur and Scoma in a study of 149 New York state preschool children failed to achieve acceptable scales from 24 hour recall data (25), as did Hertzler with six month old infants (14).

The response patterns in the scales in the present study tended to be normally distributed. Most of the individuals fell in the mid scale score ranges, with relatively few, and in some cases none, in the extreme score levels. All recalls were considered to be typical for the individual. One interpretation would be that few individuals had typical patterns that were either poorly differentiated or highly differentiated. A more likely interpretation is that what is being scaled is actually the day's menu. A score 1 dietary pattern or a score 5 dietary pattern may be extreme variants of an individual's daily range of patterns. This is further supported when mean energy intakes for each score are considered. For example, it would seem highly unlikely that 763 kcal or 14 kcal/kg would be an average intake for a woman; rather, it must represent some lower limit of typical intake. If this is correct, then it could be concluded that there is daily variation in complexity of diet as well as in nutrient intake.

The content of the scale items was similar across origin groups. At least eighty percent of respondents consumed fruit or vegetable, meat and bread (not included in scale since 100% consumed it). Eighty percent of Israelis also consumed pasta, rice or potato and eighty percent of Asians also consumed desserts.

The next category of foods consumed by 49% to 60% of the respondents, consisted of eggs (Israelis, Europe-Americans and North Africans) and desserts (Asians). A last category included foods eaten by 23% or fewer: seeds (Israelis, Asians, North Africans) and butter

(European Americans and Asians). Potato is intermediary for Europe-Americans at 29%. The distinction between the core foods and the latter groups is that the latter are single foods (potato, eggs and butter) or occupy a specific position in the diet (desserts and snacks). The inclusion of eggs may represent a more complex breakfast pattern; desserts, snacks, or a more complex meal pattern. These patterns may occur less frequently in the population, or more likely, are less than daily occurrences for individuals.

Jerome has proposed a theory to explain the dynamics of food pattern change (59). The diet is viewed as consisting of a core set of items that is relatively resistant to change, a second tier of items is in flux, foods either entering or leaving the pattern while a third tier consists of peripheral or ceremonial foods eaten only occasionally. The range of foods and response patterns in the present study appear similar to Jerome's formulation. Thus, what is defined in the scales may not be complexity, but core, secondary and peripheral foods, with the secondary foods tending to define the ethnic character of the patterns.

Most investigators have validated the content of their scales by comparison with other indices of differentiation (9,12,15,16) and with food diversity (13) and meal variety (16). In the present study it was not possible to compare dietary diversity scores with the scales due to the initial compression in coding food items.

Validation of the scales in the present study was based on comparisons with available indices of social stratification. It was hypothesized that scale score would be positively associated with other measures of social differentiation such as educational attainment, occupation status and crowding. Educational attainment was significantly higher in the high complexity group for fathers; but there was no association with occupation. Educational attainment is generally considered to be a more stable indicator of social status and less influenced by cultural bias than occupational status. Thus the positive finding for men suggests that, to the extent that scale scores represent habitual patterns in men, the scales are measuring differentiation.

These findings are consistent with other studies that have shown positive correlations of scale score with education of head of household (12,15,16,17). The finding that, at least among boys, higher complexity was associated with least crowding further supports the validity of the scales.

There was also a negative association of age with scale score for men but not for women. Other studies have also shown a negative association with age (15,16). This suggests that younger men would tend to have greater adaptive capabilities. One would also expect that children, who are still in the process of acculturation, would have greater adaptive skills than their parents. The finding that, at least among Asians and North Africans, there was a higher than expected concentration of youngsters in the upper scale strata is consistent with this notion. Furthermore, Asians and North Africans as a group are more recent immigrants into Israel and the stresses of acculturation may be greater in this group, magnifying the intergenerational differences in adaptation. This divergence of parent child dietary patterns is further supported by the lack of correlation of Asian and North African fathers' or mothers' scale scores with those of their children.

Among Israelis there was a higher concentration of mothers in score 2 and fathers in score 5 which means that more men in this group were eating eggs, seeds and desserts than women and thus tended to have different dietary patterns than women. Scale score was correlated with energy consumption, even though the response categories were dichotomies, independent of quantity consumed. Thus it is not surprising that fathers had higher mean scores than mothers. On the other hand, among the 74 homogeneous spouse pairs in the study, scale scores were correlated. Among the 32 nonhomogeneous spouse pairs there was no association. These findings suggest that although fathers may adopt a dietary pattern and lifestyle not shared by the spouse, their ethnic patterns persist.

Larkin, Owen and Rhodes in a study of differentiation of households in a Ghanaian Community showed that while differentiation indices were highly correlated for men, they showed a cumulative pattern for women. They ascribed these differences partly to differing positions of men and women in that society (15). Their indices referred to contacts in the larger society, education, occupation, etc. which are prescribed for men while women's roles lay mainly within the household. The extent to which male/female role differences in Israel explain the strength of the findings for fathers in the present study is intriguing and warrants further investigation.

Bavly noted in an earlier study of changes in Israeli food habits, the prominence of the husband's influence in introduction of new dishes into the diet (60). The influence increased from one generation to the next and was strongest among Europe-Americans. Bavly interpreted this to mean a greater adaptiveness on the part of Europeans.

Fathers' and children's scores were positively correlated overall and in the Israeli and Europe-American group, but not among mothers and children. This finding may relate to the larger sample size available for the father-child analysis. Nevertheless, the influence of the father on children's food patterns also deserves further study.

While the relation of nutrient intake to scale score was not central to the purpose of this study, the relatively stronger associations of scale score with nutrient intake compared to social status measures, supports the notion that the dominant trait measured by the scales is the complexity of one day's dietary pattern. This is further supported by the effect of work day status on scale score. A significantly larger concentration of both men and women had low scores on work days and the reverse was shown for days off.

Scale score tended to be positively associated with energy, total fat, monounsaturated fat, polyunsaturated fat and dietary cholesterol, and negatively associated with carbohydrate and starch. These relationships were more prominent among fathers, particularly for energy, fat and monounsaturated fat, and least prominent among mothers and boys. More complex diets appeared to be enriched in fat and cholesterol. The position of eggs in the scales is reflected in a concurrent increase in cholesterol as would be expected. But the same increase was observed among Asian fathers and boys even though eggs did not appear in the scale. It is interesting to note that given the strong association of energy intake with complexity, no association was found for occupation. One might have expected that men in the lower occupational categories, requiring greater energy expenditure, would have had higher complexity scores. Since this did not seem to occur, there may be opposing effects operating. Higher status jobs would be associated with higher complexity while lower status jobs with higher energy requirements would also be associated with higher complexity.

One could speculate whether the changes in diet occurring at each scale step represent differences in the structure of meals, such as more elaborate preparation, whether there were more frequent eating occasions or whether quantities of foods changed. The data suggest that the changes were different in different groups. For example, dietary cholesterol was positively associated in all origin groups for fathers. If this is solely due to the addition of eggs or increased meat consumption one would expect protein also to be positively associated with scale score. In fact, protein was positively associated only for Israeli fathers. Total fat increased with scale step for every origin group, monounsaturated fat for three of the four groups and polyunsaturated fat for two origin groups. This suggests that larger portions of protein containing foods were being added as scale score increased for Israeli fathers, while perhaps more elaborate fat containing preparations may have contributed to the differences observed in the other groups.

It is interesting that neither sugar nor alcohol was related to scale score. The major sources of sugar in Jerusalem diets are beverages (soft drinks, coffee, tea). Likewise alcohol is consumed as a beverage. Beverages, either separately or combined, did not scale, indicating that their use may reflect another dimension that is unrelated to differentiation such as recreation.

Since the dietary data were collected and coded to reflect macronutrient intake thought to be associated with cardiovascular disease, it was not possible to retrieve information on essential nutrients other than protein. Thus it was not possible to evaluate nutritional adequacy at each scale step. Nor can the present study be compared with other studies using scalogram analysis to evaluate nutritional adequacy.

It was hypothesized that if dietary differentiation is a surrogate for adaptive skill, then one would expect greater differentiation to be exhibited in stress producing situations. Of the three indices of incongruity tested, none achieved significance in differentiating sub-groups. The combined scale incorporating education and origin appeared to have a marginal effect, suggesting that incongruity tends to be associated with a higher score. This finding, although marginal, is consistent with the hypothesis.

It was further hypothesized that, if dietary differentiation is a surrogate for adaptive skill, stress related health indices and behavioral characteristics would be associated with scale score. Specifically, blood pressure, obesity, smoking and alcohol use would be negatively associated with scale score or dietary complexity. No differences were observed in any of these parameters except for alcohol use among boys. The number of users was higher at score 1 than at score

5. This finding is consistent with the hypothesis, but the overall use of alcohol was very low.

It should also be noted that despite the random selection study design for parents, respondents were selected from largely intact families. Thus the support systems maintained by strong family bonds characteristic of the Jewish culture could in themselves offset the effects of stress.

The finding of a higher mean plasma cholesterol level in fathers in the high complexity group merits further investigation. It could be a dietary effect since the higher complexity patterns were found to be higher in fat and cholesterol.

All of the findings in this exploratory study must be interpreted with caution and any significant results should be regarded as tentative. Because of the large number of comparisons it would be expected that significant results would appear due to chance. No adjustments were made in the analysis to correct for spurious associations.

SUMMARY AND CONCLUSIONS

An exploratory study was undertaken to determine the feasibility and validity of scalogram analysis of 24 hour recall data to stratify individuals on the basis of degree of differentiation and to test whether differentiation is related to coping behavior. The results reported here should be interpreted with extreme caution. Multiple comparisons were made in each analysis, greatly increasing the probability of chance associations. No corrections were made in the p values to adjust for this possibility. It should also be noted that sample sizes in some scale scores were extremely small. Extreme values in these cells should not be regarded as stable indicators.

Scales generated using the Guttman procedure did not meet acceptable scalogram criteria. Subsequent adjustment according to the Proctor formulation of the Guttman scale model produced acceptable scales for three of four origin groups. The scales should thus be regarded as quasi scales. Validation of the scales was based on the relationship of the scale scores with age, educational attainment and occupational status. Educational attainment of fathers was positively related to scale score. Mean age of fathers was lower in the high complexity stratum. Asian and North African youngsters also predominated in the high complexity stratum compared to their parents.

The most prominent finding in the study was the relationship of scale score with nutrient intake, showing that diets in the upper scale scores tended to be enriched with respect to energy, percent of calories from fat, and dietary cholesterol and poorer in percent of calories from carbohydrate and starch. Again the results were most striking among fathers. This finding suggests that both qualitative and quantitative changes are associated with scale score. Scale score was also affected by work day status. These findings together with the overall weak or absent associations of scale score with social class variables suggests that the scales performed better in classifying dietary patterns than individuals and that only to the extent that habitual pattern is captured by a one day recall may the underlying differentiation trait be revealed.

For these reasons it was not surprising that the scales were not associated with stress-related behavior and health variables. The lack of association does not necessarily refute the contention that differentiation is related to coping behavior and subsequent illness, which is well supported in the literature. It may be that the 24 hour recall is too blunt an instrument to measure dietary differentiation. It may also reflect the fact that despite ethnic differences that have been preserved in the Jerusalem Jewish community, all have access to the same food supply. Subtle differences in food patterns that differentiate individuals may need a different type of instrument - one that distinguishes differences in cooking method, flavoring and structural components. Most nutritional scalogram analysis has focused on predicting nutrient intake from scale scores rather than using food behavior as a surrogate for abstract social constructs. Furthermore, the model as proposed in this study does not take into account the impact of the nutritional qualities associated with dietary diversity. In preindustrial societies, diversity is often, though not always, associated with an increase in essential nutrients, which would have a positive effect on health outcome. In affluent societies, increased intakes of energy, fat and cholesterol would tend to have a negative impact on health outcome. Future studies to assess the relationship of differentiation to coping skills would need to account for these potential intervening variables in the study design and selection of outcome variables. The present study suffered from constraints imposed by a protocol that was directed at assessing cardiovascular risk factor status in the community. Thus there is reason for cautious optimism that future studies using more appropriate protocols and better measurement tools, not only for collecting information on food patterns, but for better social differentiation, coping and stress indicators, would be more successful in demonstrating the relationships sought in this study, if indeed they exist.

The strength of the findings with respect to fathers merits further investigation from the standpoint of his impact (seemingly independent from the mother) on family food habits and also from the standpoint of stability of dietary patterns and attitudes toward food.

An interesting and potentially useful finding relates to the nutritional concomitants of dietary complexity. As shown in this study, the most complex diets were enriched in fat and cholesterol. Mean plasma cholesterol was also significantly higher in fathers in the high complexity category. Scalogram analysis of food frequency data might provide a rapid means of classifying individual dietary patterns with respect to CHD risk, at least in Israel. Furthermore, increasing calories, fat and cholesterol is the direction taken by national food patterns as affluence increases. By examining the more complex diets within industrializing countries, it might be possible to predict the exact nature of the changes and to intervene in order to prevent deterioration of the diet, particularly with respect to chronic diseases.

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APPENDIX 1

Manual of Dietary Procedures

MANUAL OF DIETARY PROCEDURES

for the

HADASSAH LIPID RESEARCH CLINICS

I. Introduction

This manual was developed specifically for dietitians participating in the (Jerusalem Collaborative Lipid Research Clinics Prevalence Studies). The purpose of the manual is to provide guidelines for dietitians to insure intraclinic uniformity of procedure in the dietary aspect of the study. This manual should be considered the authority in all questions concerning dietary procedures. Any deviation from the procedures spelled out in this manual must receive approval of the Steering Committee. Any dietary procedures not mentioned in this manual should be brought to the attention of the Jerusalem and the US LRC Program Office.

This manual is to serve, primarily, as a guide for dietitians in administering and coding dietary recalls. It is anticipated that the manual will assist the LRC dietitians as follows:

(1) To establish uniformity in methods, techniques and procedures (as much as possible, tested methods are being employed).

(2) To serve as a reference to insure uniform coverage of material with each participant in and between the Lipid Research Clinics.

(3) To serve as a guide for the handling of dietary data.

(4) To assist in training dietitians and nutritionists who will be part of the LRC team.

II. The Study

A. Purpose

Dietary data are collected for the purpose of obtaining information on the dietary intake of a representative sample of prevalence populations. The Visit 2 population includes hyperlipoproteinemic subjects identified from Visit 1 and a random subsample of normal subjects from Visit 1.

B. Objectives

1. To collect data suitable for comparing the intake of certain nutrients in various groups, such as different ages, sexes, types of hyperlipoproteinemia, geographic areas, etc.

2. Within the limits of time imposed by the study design, it is possible to get only quantitative group data. These data will be used to study the relationship between group diet patterns, lipid levels and lipoprotein patterns. Dietary data collected in this study should not, in any instance, be interpreted as data for an individual. To derive quantitative data which can validly correlate the intake of an individual with his lipids would require more time and specially trained personnel than are in or can be made available to every LRC. There are methods which might be employed to obtain individual dietary data such as repetitive 24-hour recalls or records or long period records. The Burke method, a specifically designed research type dietary history, requires at least 6 months of training for interviewers, 45 minutes to 1-½ hours to administer and an equal period of time for interpretation. Implicit in the time requirement to collect data for individual comparisons is the possibility of losing the subject's cooperation.

3. The nutrients to be considered are total calories, carbohydrate, protein fat, cholesterol, total saturated fatty acids, mono-unsaturated fatty acids, and polyunsaturated fatty acids, refined and other sugars, complex CHO and alcohol. Present food tables lack precise data for the estimation of other nutrients which might effect serum lipid levels. If more complete information becomes available, food tables could be updated for further computer analysis of the data.

III. Collection of Data

A. One Day Dietary Recall Form

1. Purpose

The One Day Dietary Recall form is to be used to obtain information on what foods and beverages a subject has eaten over the 24-hour period preceding the 12-hour fasting period. This will not include information on drugs and vitamins. The information will be coded for computerization and used for comparison of group dietary intake.

2. Use of the One Day Dietary Recall Form

(a) The One Day Dietary Recall form (see sample, Appendix pp) is to be used for all subjects 6 years of age or older in the Prevalence Study.

(b) The One Day Dietary Recall form is used only at Visit 2. The interview for the One Day Dietary Recall must be conducted on the same day that the subject's blood is drawn and at no other time.

(c) One Day Dietary Recalls reflecting weekend or holiday intake are to represent 15% to 30% of the total recalls collected. This percentage is to be collected consistently throughout the Prevalence Study to avoid introducing a possible bias. Implementation of this will require some clinic visits to be scheduled on Monday.

(d) The One Day Recall should cover a period as necessary to include a usual day's intake ending when the fast is begun the night before the recall. If a subject habitually eats a snack in the evening but omitted it the night before, the recall should begin with the snack (but not the supper) from the previous night (the night preceding the night of the fast). If instead of omitting the snack, he either increased his supper or ate a snack just prior to beginning the fast, the recall should begin with "the time of arising yesterday."

3. Standardized Procedures for Conducting the Interview

(a) Basic instructions for conducting the dietary interview are provided with the instructions for the use of the One Day Dietary Recall form. Only certified dietitians can conduct interviews. The best interviews will be obtained in a congenial and relaxed atmosphere. The location and physical surroundings should be quiet, private and as attractive as possible. A cordial greeting and brief explanation of the study will usually put the subject at ease. It may help to explain that the information obtained is confidential and will be put into a computer and pooled with data from other individuals.

The attitude of the interviewers should convey interest but should never be judgmental. The purpose of the Prevalence Study interview is to gather information on what people eat, not to evaluate individual dietaries nor to advise. If the participant understands this, it will help to avoid a tendency to report a "good" intake while concealing what he may feel is inferior or shameful.

The accuracy of the one day recall is partly dependent on the subject's ability to remember. Since food, especially snacks are often associated with other activities, it is helpful to encourage the subject to recall the activities of the previous day, whom he was with, where he went, etc, and then, as he recalls, have him relate this to his food intake.

People respond differently to different cues and the interviewer may have to try several approaches to elicit the information. In his zeal to obtain a complete recall, however, the interviewer should never force the respondent into making a choice when he really cannot remember.

Questions should be phrased in such a way that the subject cannot give only a "yes" or "no" response. That is, they must not be leading or suggestive.

If the subject has already heard about the study from another participant, he may write down what he has eaten in advance of the interview. The interviewer is not allowed to use this information since such a document constitutes a diet record and is thus not comparable with the data obtained from the other subject. Thanking him for his interest in the study, etc., the interviewer puts away the record, and conducts the interview in the standard manner.

(b) Terminology. The interviewer should be thoroughly familiar with local customs and terminology. Errors can easily occur if the subject mentions "butter" when he really means "margarine", or refers to evaporated milk as "cream."

It is preferable to tie the day's intake to the time of day rather than to specific meals. In some cases, it may be misleading to ask what someone ate for "breakfast" when what he had, in fact, was a series of snacks in the morning. A better approach is to ask what the subject ate or drank first after arising. Be sure that the subject understands that he is to describe the food that was actually eaten and not that which was served.

(c) <u>Food Models</u>. The interview is to be conducted using a complete and standard set of food models and measuring standards (Appendix). Food models used correctly will help the respondent make more accurate estimates of the food portions he has eaten. Used incorrectly, they may "suggest" erroneous responses.

The subject should have an array of models from which to select. Models should be displayed in different sized containers (plates, dishes, etc.) since portions appear different depending on the size of the container. Food models also appear more natural when presented in regular tableware than in boxes, etc. Subjects should be allowed to handle the models.

The phrasing of the questions is important. "Was the meat you ate like this model?" will encourage an affirmative response regardless of its accuracy if the subject has no alternatives. A better technique is to force the subject to make a judgment by phrasing the question so that it cannot be answered "yes" or "no". For example, "Can you compare the meat you ate to any of these models?"

(d) Post Interview Information.

(1) If in reviewing the recall, you discover that you did not collect sufficient information from the subject, he may be contacted for further information later in the same day.

(2) If you require additional information on a subject's intake you may call the home or restaurant for the following types of information:

a. Whether fat was or was not added to a food or recipe item.

b. What type of fat was used as a spread or in food preparation.

c. A recipe for a food item which the subject was unable to describe adequately for coding.

If in the course of collecting this clarifying information from any source other than restaurants, you discover that there are discrepancies between what the subject has recalled and what the contacted person recalls, you must <u>not</u>

a. Change the subject's estimate of the amount of food eaten.

b. Change any food item that the subject recalled: for example, the subject recalled mousse for dessert, wife recalled serving jello.

c. Add any forgotten item.

d. Change your opinion of the reliability of the data collected at the interview.

(3) Collection of Institutional Food Service Information.

If the recollection of the respondent's intake conflicts with what is known to be served in a restaurant, the restaurant information should be used.

C. Standardized Procedures for Coding One Day Dietary Recalls.

1. Only LRC dietitians certified for coding may code (see certification procedure pp 12).

   The dietitian who conducted the interview for the One Day Dietary Recall must code the recall.

2. Basic instructions for tallying and coding the One Day Dietary Recall are provided with the instructions for the use of the One Day Dietary Recall form.

   Thorough instructions and practice in coding are provided during the training session (s) given by the Chief Dietitian which all LRC dietitians must attend.

3. Each LRC dietitian is provided with a Coding Notebook when he or she attends the coding workshop. The Coding Notebook contains the collaborative food table (food composition figures) which is broken down into the same sections as are found in the coding section of the One Day Dietary Recall form.

4. A dietitian at each LRC is supplied with a standard set of Manufacturers Food Composition Data.

LRC dietitians who have more current or additional information should give it to the Chief Dietitian for distribution to all other dietitians and the LRC Program Office in Bethesda (USA).

5. Procedures for Dealing with Coding Problems.

(a) To code food items not covered by information in the Coding Notebook, consult the appropriate reference.

(1) U.S.D.A. Handbook #8

(2) Fatty acid and cholesterol composition of foods, published in the J. Amer. Dietet. Assoc. 1972-1976.

(3) Composition of Israeli Foods (Guggenheim, Kaufmann and Reshef.)

(4) Restaurants

(5) Home Recipes

(6) The Israeli Cookbook

(7) Data from manufacturers

(b) When the composition of an item is determined, it may be coded into an existing category or a combination of categories in the food table if the protein, fat and carbohydrate are within 5 grams. For items containing 5 gms or more of fat in serving, cholesterol must be within 5% and each of the fatty acid groups - saturated, monoenoic and polyenoic - must be within 25% of the food composition figures of the existing category or categories.

(c) When it is not possible to code an item into an existing category, it must be hand coded in the Diet Miscellany table on page 4 of the One Day Dietary Recall form. If this procedure is used, all the nutrients that are to be computerized must be included.

(d) When a local decision has been made in coding an item that will be encountered in other LRC's, the Chief Dietitian is to be notified. This information will be added to the Coding Notebook and distributed to all other dietitians and the US LRC program office by the Chief Dietitian. Thereafter, such an item will be coded in a standard manner.

(e) If the dietitian is unsure of a coding decision or is unable to make a coding decision concerning an item, the Chief Dietitian should be notified and she will make the decision.

A copy of all additions to the Coding Notebook should be forwarded to the US LRC program office.

6. The Collaborative Food Table

A central table of food composition figures was developed by the LRC program office and Jerusalem nutritionists to provide a standard food composition figures.

Nutrients included in the table are protein, total fat, total saturated, monoenoic and polyenoic fatty acids, total carbohydrate, refined sugar, other sugar and complex carbohydrate, cholesterol and alcohol.

Foods are grouped according to similarity in nutrient composition. This is the same grouping as is found in the coding section of the One Day Dietary Recall form. Dairy products are categorized according to fat and cholesterol content. Eggs and egg whites are categorized separately. Fruits are categorized according to total carbohydrate and addition of sugar. Vegetables are categorized according to total carbohydrate content and, where appropriate, total fat content. Grain products including breads and cereals are categorized primarily according to total carbohydrate content, total fat content, and for egg noodles, the cholesterol content. Soups and sauces are categorized according to total carbohydrate and total fat. Fats and nuts are categorized according to differences in polyunsaturated to saturated fat ratio. Desserts are categorized according to differences in total carbohydrate, total fat and cholesterol. Beverages are categorized according to carbohydrate, alcohol content and addition of sugar.

The Central food table is the core of the data program for computerizing dietary data from the LRC's. Revisions of or additions to the food table will be made jointly by the LRC program office and the Director, Nutritionist Studies, Jerusalem.

7. Food composition books are to be consulted in the following order:

<u>For Total Nutrients</u>

USDA Handbook #8	or	Israeli Tables of Food Composition
(fruits, vegetables, grains)		(Animal products and commercial products)

<u>For Fatty Acids</u>

(1) J. Amer. Dietet. Assoc. 66: 482-487, (1975)
(2) J. Amer. Dietet. Assoc. 66: 36-41, (1975)
(3) J. Amer. Dietet. Assoc. 66: 111-115, (1975)
(4) J. Amer. Dietet. Assoc. 66: 351-355 (1975)
(5) J. Amer. Oil Chem. Soc. 52: 154-159 (1975)

<u>For Cholesterol</u>

(1) J. Amer. Dietet. Assoc. 61: 134, 1972 & 62: 275, 1973.
(2) USDA #8 (1963)

8. It is often necessary to consult a recipe book rather than the food composition books as the cholesterol, fatty acids and breakdown of carbohydrate cannot always be determined from the other sources.

These books are:

Bar-David, M.L. The Israeli Cookbook, Crown, N.Y. (1975)

IV. Training and Monitoring Dietitians in the Prevalence Studies.

A. Training (see detailed procedure Appendix 1A).

1. Interviewing

Each LRC dietitian must attend the training session(s) conducted by the Chief Dietitian before he or she may interview subjects for the Prevalence Studies.

2. Coding

(a) Each dietitian must attend the diet coding workshop held by the Chief Dietitian, and satisfactorily complete the workshop program.

(b) Phase 1: Each dietitian must satisfactorily code ten (10) standard recalls. These recalls will be given to each dietitian when he or she attends the workshop. The recalls are to be coded by each dietitian independently and original copies of the coded recalls returned to the Chief Dietitian who will forward them to the US LRC program office for approval.

(c) Phase 2: Each dietitian must obtain and code One Day Dietary Recalls from ten (10) subjects similar in age to the study subjects but not study subjects. These recalls are to be taken and coded <u>after</u> the US LRC program office has approved the first ten recalls. The original or readable xerox copies of the coded ten(10) recalls from local subjects are to be sent to the Chief Dietitian who will forward them to the US LRC program office to the individual dietitians.

Nutrition Training Agenda

Jerusalem Lipid Research Clinic

First Session (Half-day)

I. L.R.C. PROGRAM OVERVIEW

Objective: To understand and appreciate the role of the Jerusalem LRC as a participant in the multi-centered collaborative program.

Teaching aids: Slides

A. Prevalence
B. Organization of Jerusalem LRC Prevalence Study

II. DIETARY METHODOLOGY

Objectives: To be able to distinguish between methodologies and select the appropriate methodology.

Teaching aids: Slides

A. Comparison
B. Basis of selection for LRC of "24 hour recall"
C. Food tables - comparison
   Short method vs. long method
D. Basis of selection for LRC

III. INTERVIEWING

Objectives:

1. To be able to distinguish between counseling and research-type interviews.
2. To be able to conduct an interview in a standardized and unbiased manner.
3. To elicit complete and accurate information from the participant.

Teaching aids: Demonstration interview tapes, "Guidelines for Evaluating Dietary Interview Skills."

A. Research Interview vs. Counseling Interview
B. Techniques
   1. Establishing rapport
   2. Use of terminology in cultural context

3. Use of food models
4. Use of probes

C. Demonstration (tape)

D. Critique

Second Session (Full Day)

IV. THE FORM AND ITS USE - INTERVIEW PORTION

Objective: To be able to record interview information completely and accurately so that it can be coded correctly.

Teaching aids:

1. Instructions for filling out the one-day recall form
2. One-day recall form
3. Tapes of demo interviews
4. Examples of good and poor documentation
5. Exercise: "Supply the missing information"
6. Guidelines for obtaining Post Interview Information
7. Practice interview tapes

A. Recording the information

B. Documentation
   1. Examples
   2. Exercise

C. Post-Interview information
   1. Guidelines
   2. Exercise

D. Practice interviews with standard response

E. Critique

V. CODING

Objective: To be able to code all food items correctly on the form.

Teaching aids: Coding book
Reference materials
"Instructions"
Recall Form
Recipes

A. Coding book - detailed review

B. Reference material and its use

C. Recipe calculation
   1. Examples
   2. Exercise

D. Form and its use - coding portion
   1. Demonstration
   2. Practice

VI. <u>QUALITY CONTROL</u>

Objective: To develop an appreciation and understanding of the methods by which quality of the data can be controlled in a collaborative mode.

Teaching aid: Slides

A. Training
B. Certification
C. Monitoring

VII. <u>SUMMARY</u>

A. Review and discuss procedure manual
B. Give out Phase I certification recalls.

APPENDIX 2

Description of Food Variable Content

DESCRIPTION OF VARIABLE CONTENT

VARIABLE NAME	INCLUDES
DAIRY	0001 milk, whole
	0002 milk, whole
	0005 milk, chocolate
	0017 cocoa beverage
	0003 milk, skim
	0004 milk, skim
	0006 cream
	0007 sour cream
	0008 eshel
	0009 leben, gil
	0010 raz, leben
	0011 yoghurt
	0012 soft cheese
	0013 soft cheese
	0014 soft cheese
	0015 hard cheese
	0016 butter
	0706 cheese pizza
	0711 cheese filling
MEAT	0201 beef, lean
	0202 beef, medium fat
	0203 ground beef
	0204 mutton, lean
	0205 mutton, fat
	0206 cooked veal
	0207 pork, untrimmed
	0208 pork, trimmed
	0209 beef liver
	0210 beef heart
	0211 chicken liver
	0212 chicken heart
	0213 giblets
	0214 chicken, dark (no skin)
	0215 chicken, dark (with skin)
	0216 chicken, light (no skin)
	0217 chicken, light (with skin)
	0218 goose, with skin
	0219 goose, no skin
	0220 fish 2% fat
	0221 fish, med fat
	0222 canned fish

VARIABLE NAME	INCLUDES
MEAT (Cont.)	0223 meat ball
	0224 poultry ball
	0225 gelfilte fish
	0226 cold cuts I
	0227 cold cuts II
	0228 cold cuts III
	0229 cold cuts IV
	0230 liverwurst
	0701 bouillon
	0703 cholent
	0707 poultry filling
	0708 meat filling
	0710 meat/rice filling
	0801 chicken fat
	0802 beef fat
EGGS	0301 egg, whole
	0302 egg, whole 1/4
	0303 egg white
FRUIT	0401 fruit 1, unsweetened
	0402 fruit 2, unsweetened
	0403 fruit 3, sweetened
VEG	0501 leafy raw
	0502 leafy cooked
	0503 roots
	0504 legumes
	0505 corn
	0702 vegetable soup
	0704 bean soup
	0705 tomato vegetable sauce
	0709 spinach filling
	0815 olives
	0507 humous
	0508 felafel
POTATO	0506 potato
STARCH	0607 pasta, rice

VARIABLE NAME	INCLUDES
GRAINS	0601 bread 0602 challah 0604 crackers 0605 crackers 0603 cornflakes 0606 cooked cereal 0607 pasta, rice (see "starch")
BUTTER	0016 butter
VEG FAT	0803 olive oil 0804 soy oil 0805 corn oil 0806 peanut oil 0807 sunflower oil 0808 margarine, baking 0809 margarine, stick 0810 margarine, tub 0811 margarine, clorina 0812 mayonaise 0813 tehina 0814 avocado 0816 peanut butter
SEEDS	0817 sunflower seeds 0820 pumpkin seeds 0901 peanuts
DESSERTS	0105 hard candy 0101 ice cream 0102 ice cream 0103 ice cream 0104 ice cream 1005 ice cream 1006 chocolate candy 1009 cake icing 1010 pudding 1011 jello 1012 biscuit 1013 cookie 1014 cookie 1015 cookie dough 1018 coconut cake 1019 pound cake 1020 yellow cake 1021 sponge cake 1022 yeast cake 1023 cheese cake
DESSERTS (Cont.)	1024 honey cake 1025 English cake 1026 chocolate cake 1027 doughnut 1028 halva 1029 ice cream cone 1030 fruit ice 1032 choclate spread 0902 walnuts 0903 pine nuts 0904 coconut 0907 sesame seeds 1017 blintz 1016 boreka
SOFT DRINKS	1101,1103
ALCOHOL	1102 beer 1104 dry wine 1105 dessert wine 1106 brandy, whiskey

APPENDIX 3

Status Consistency Algorithm

STATUS CONSISTENCY ALGORITHM

ALGORITHM

EDUCATION Female	EDUCATION Male		ORIGIN	CONSISTENCY VALUE	
1	1	1	E	1	consistent
			NE	2	moderately consistent
1	2	2	E	2	moderately consistent
			NE	3	inconsistent
1	3	3	E	3	inconsistent
			NE	4	sharply inconsistent
2	1	2	E	2	moderately consistent
			NE	3	inconsistent
2	2	1	E	1	consistent
			NE	2	moderately consistent
2	3	2	E	2	moderately consistent
			NE	3	inconsistent
3	1	3	E	3	inconsistent
			NE	4	sharply inconsistent
3	2	2	E	2	moderately consistent
			NE	3	inconsistent
3	3	1	E	1	consistent
			NE	2	moderately consistent

E, Equal NE, Not Equal

EDUCATION 1 < Highschool 2 Highschool graduate 3 > Highschool

ORIGIN 1 Israeli 2 Europe American 3 Asian, North African

APPENDIX 4

Guttman Scales

GUTTMAN SCALE ANALYSIS

	SEEDS		EGGS		STARCH		MEAT		FRUITVEG		TOTAL
SCALE SCORE	0	1	0	1	0	1	0	1	0	1	
5	0*	50	0*	50	0*	50	0*	50	0*	50	50
4	166	65*	39*	192	14*	217	9*	222	3*	228	231
3	223	17*	134	106*	95*	145	26*	214	2*	238	240
2	92	3*	84	11*	82	13*	23*	72	4*	91	95
1	25	0*	23	2*	23	2*	23	2*	6*	19	25
0	0	0*	0	0*	0	0*	0	0*	0	0*	0
TOTAL	506	135	280	361	214	427	81	560	15	626	641
PERCENT	78	22	43	57	33	67	12	88	2	98	
ERRORS	0*	85*	39*	119*	109*	15*	58*	2*	15*	0*	442

* RESPONSES IN ERROR

Fig. 2A Israeli Guttman Scale

GUTTMAN SCALE ANALYSIS

SCALE SCORE		BUTTER	POTATO	EGGS	MEAT	FRUITVEG	TOTAL
		0	0	0	0	0	
		1	1	1	1	1	
5	0	0*	0*	0*	0*	0*	26
	1	26	26	26	26	26	
4	0	89	25*	7*	0*	0*	121
	1	32*	96	114	121	121	
3	0	153	138	58*	9*	0*	179
	1	26*	41*	121	170	179	
2	0	139	133	126	24*	7*	143
	1	4*	10*	17*	119	136	
1	0	18	18	18	17	1*	18
	1	0*	0*	0*	1*	17	
0	0	0	0	0	0	0	0
	1	0*	0*	0*	0*	0*	
TOTAL	0	399	314	209	50	8	487
	1	88	173	278	437	479	
PERCENT	0	81	64	42	10	1	
	1	19	36	58	90	99	
ERRORS	0	0*	25*	65*	33*	8*	262
	1	62*	51*	17*	1*	0*	

* RESPONSES IN ERROR

Fig. 2B Europe-American Guttman Scale

GUTTMAN SCALE ANALYSIS

	BUTTER		SEEDS		DESSERTS		VEGFAT		FRUITVEG		TOTAL
SCALE SCORE	0	1	0	1	0	1	0	1	0	1	
5	0*	14	0*	14	0*	14	0*	14	0*	14	14
4	82	25*	21*	86	2*	105	2*	105	0*	107	107
3	242	18*	223	37*	42*	218	11*	249	2*	258	260
2	189	5*	183	11*	167	27*	33*	161	10*	184	194
1	34	0*	34	0*	34	0*	28	6*	6*	28	34
0	0	0*	0	0*	0	0*	0	0*	0	0*	0
TOTAL	547	62	461	148	245	364	74	535	18	591	609
PERCENT	89	11	75	25	40	60	12	88	2	98	
ERRORS	0*	48*	21*	48*	44*	27*	46*	6*	18*	0*	258

* RESPONSES IN ERROR

Fig. 2C Asian Guttman Scale

GUTTMAN SCALE ANALYSIS

	SEEDS		EGGS		DESSERTS		MEAT		FRUITVEG		TOTAL
SCALE SCORE	0	1	0	1	0	1	0	1	0	1	
5	0*	44	0*	44	0*	44	0*	44	0*	44	44
4	74	34*	23*	85	7*	101	4*	104	0*	108	108
3	159	13*	107	65*	54*	118	19*	153	5*	167	172
2	87	2*	79	10*	75	14*	21*	68	5*	84	89
1	10	0*	10	0*	8	2*	10	0*	2*	8	10
0	0	0*	0	0*	0	0*	0	0*	0	0*	0
TOTAL	330	93	219	204	144	279	54	369	12	411	423
PERCENT	78	22	51	49	34	66	12	88	2	98	
ERRORS	0*	49*	23*	75*	61*	16*	44*	0*	12*	0*	280

* RESPONSES IN ERROR

Fig. 2D North African Guttman Scale

APPENDIX 5

Tables for Sociodemographic and Family Correlates Analyses

Table 4. Effect of origin on Guttman scale score distributions

origin	Guttman scale scores												
	1		2		3		4		5		total		sig[*]
	n	%	n	%	n	%	n	%	n	%	n	%	
						fathers							
Israeli	5	2	19	8	68	30	108	48	27	12	227	29	
Eu. Am.[†]	7	4	73	38	58	30	41	22	11	6	190	24	
Asian	19	9	79	37	89	42	23	11	3	1	213	27	
N. African	4	3	34	23	35	24	60	41	13	9	146	19	
total	35	4	205	26	250	32	232	30	54	7	776	100	<0.0001[‡]
						boys							
Israeli	7	5	15	11	52	37	55	39	13	9	142	28	
Eu. Am.[†]	0	0	38	33	42	36	27	23	8	7	115	22	
Asian	8	5	41	26	72	46	30	19	6	4	157	31	
N. African	4	4	15	16	27	29	34	36	14	15	94	18	
total	19	4	109	21	193	38	146	29	41	8	509	100	<0.0001[#]
						mothers							
Israeli	7	5	31	21	36	24	67	45	9	6	150	34	
Eu. Am.[†]	3	3	35	38	35	38	15	16	3	3	91	20	
Asian	10	8	35	30	45	39	24	21	2	2	116	26	
N. African	0	0	23	26	17	19	41	46	7	8	88	20	
total	20	4	124	27	133	30	147	33	21	14	445	100	<0.0001[¶]
						girls							
Israeli	4	3	29	24	40	33	42	34	7	6	122	28	
Eu. Am.[†]	7	8	34	37	33	36	13	14	4	4	91	21	
Asian	5	4	26	21	59	48	30	24	3	2	123	28	
N. African	2	2	8	8	42	44	33	35	10	10	95	22	
total	18	4	97	22	174	40	118	27	24	6	431	100	<0.0001[‖]

[*] X^2 significance.

[†] Europe-American.

[‡] $X^2_{12} = 149.687$, [#] $X^2_{12} = 50.689$, [¶] $X^2_{12} = 54.774$, [‖] $X^2_{12} = 42.398$

Table 5. Effect of gender on Guttman scale score distributions

origin	male		female		total		sig*
	n	%	n	%	n	%	
Israeli							
1	12	52	11	48	23	4	
2	34	36	60	64	94	15	
3	120	61	76	39	196	31	
4	163	60	109	40	272	42	
5	40	71	16	29	56	9	
total	369	58	272	42	641	100	0.0001
Eu. Am.							
1	7	41	10	59	17	3	
2	111	62	69	38	180	37	
3	100	60	68	40	168	34	
4	68	71	28	29	96	20	
5	19	73	7	27	26	5	
total	305	63	182	37	487	100	0.0887
Asian							
1	27	64	15	36	42	7	
2	120	66	61	34	181	30	
3	161	61	104	39	265	44	
4	53	50	54	50	107	18	
5	9	64	5	36	14	2	
total	370	61	239	39	609	100	0.0819
N. African							
1	8	80	2	20	10	2	
2	49	61	31	39	80	19	
3	62	51	59	49	121	29	
4	94	56	74	44	168	40	
5	27	61	17	39	44	10	
total	240	57	183	43	423	100	0.3102

*X^2 significance.

Europe-American.

$X^2_4 = 23.990$

Table 6. Effect of generation on Guttman scale score

origin	parent		child		total		sig*
	n	%	n	%	n	%	
Israeli							
1	12	52	11	48	23	4	
2	50	53	44	47	94	15	
3	104	53	92	47	196	31	
4	175	64	97	36	272	42	
5	36	64	20	35	56	9	
total	377	59	264	41	641	100	0.0767
Eu. Am.†							
1	10	59	7	41	17	3	
2	108	60	72	40	180	37	
3	93	55	75	45	168	35	
4	56	58	40	42	96	20	
5	14	54	12	46	26	5	
total	281	58	206	42	487	100	0.9172
Asian							
1	29	69	13	31	42	7	
2	114	63	67	37	181	30	
3	134	51	131	49	265	44	
4	47	44	60	56	107	18	
5	5	36	9	64	14	2	
total	329	54	280	46	609	100	0.0017‡
N. African							
1	4	40	6	60	10	2	
2	57	71	23	29	80	19	
3	52	43	69	57	121	29	
4	101	60	67	40	168	40	
5	20	45	24	55	44	10	
total	234	55	189	45	423	100	0.0005#

*X^2 significance.

†Europe-American.

‡$X^2_4 = 17.225$, #$X^2_4 = 19.921$

Table 7. Parents' mean age by dietary complexity* and gender. All origin groups combined

group	mean†		significance‡
	n	years	
fathers			
low	343	50.0±7.2	
high	433	48.7±6.0	0.009
mothers			
low	197	44.7±5.0	
high	248	44.6±5.4	0.866

*Complexity defined as low/high: below/above mean Guttman scale score.

†Mean years ± standard deviation.

‡Significance of student's t Test.

Table 8. Mean years of education by dietary complexity for mothers and fathers

group	n	mean*	sig.†
fathers‡			
low	343	10.5±5.0	
high	433	11.8±4.6	0.000
fathers#			
low	343	8.8±5.6	
high	432	9.9±5.5	0.004
mothers‡			
low	197	9.1±5.0	
high	248	9.0±4.9	0.750
mothers#			
low	191	9.6±5.4	
high	245	9.6±5.5	0.858
mothers¶			
low	175	9.2±4.9	
high	217	9.0±4.8	0.676

*Mean±standard deviation.

†Significance of student's t Test.

‡Secular plus religious education of head of household.

#Secular education of head of household.

¶Secular education of self.

Table 9. Occupation of head of household in high and low dietary complexity categories* for fathers by origin group

group	occupational codes†						total		sig‡
	1		2		3				
	n	%	n	%	n	%	n	%	
Israeli									
low	33	37.1	25	28.1	31	34.8	89	39.9	
high	48	35.8	52	38.8	34	25.4	134	60.1	
total	81	36.3	77	34.5	65	29.1	223	100.0	0.1788
Eu. Am.#									
low	37	48.1	25	32.5	15	19.5	77	41.8	
high	63	58.9	26	24.3	18	16.8	107	58.2	
total	100	54.3	51	27.7	33	17.9	184	100.0	0.3296
Asian									
low	7	7.7	32	35.2	52	57.1	91	45.3	
high	4	3.6	50	45.5	56	50.9	110	54.7	
total	11	5.5	82	40.8	108	53.7	201	100.0	0.2070
N. African									
low	4	6.0	25	37.3	38	56.7	67	48.2	
high	4	5.6	29	40.3	39	54.2	72	51.8	
total	8	5.8	54	38.8	77	55.4	139	100.0	0.9373
all									
low	81	25.0	107	33.0	136	42.0	324	43.4	
high	119	28.1	157	37.1	147	34.8	423	56.6	
total	200	26.8	264	35.3	283	37.9	747	100.0	0.1308

*Complexity defined as low/high: below/above mean Guttman scale score.

†Occupation codes: 1 = highest.

‡ X^2 significance.

#Europe-American.

Table 10. Dietary complexity* by period of residency in Israel

group	period of residency†										total		sig‡
	1		2		3		4		5				
	n	%	n	%	n	%	n	%	n	%	n	%	
fathers													
low	53	41	157	47	24	49	17	44	0		251	46	
high	76	59	175	53	25	51	22	56	0		298	54	
total	129	23	332	60	49	9	39	7	0		549	100	0.6309
mothers													
low	22	45	82	42	11	34	7	44	1	50	123	42	
high	27	55	114	58	21	66	9	56	1	50	172	58	
total	49	17	196	66	32	11	16	5	2	1	295	100	0.9101

*Complexity defined as low/high: below/above mean Guttman scale score.

† Residency code: 1 = <1948, 2 = 1948-1957, 3 = 1958-1967, 4 = 1968-1977, 5 = <3 years.

‡ X^2 significance.

Table 11. Dietary complexity* by crowding index

group	crowding index† 1 n	1 %	2 n	2 %	3 n	3 %	4 n	4 %	total n	total %	sig‡
fathers											
low	24	56	65	50	179	42	75	41	343	44	
high	19	44	66	50	242	57	106	59	433	56	
total	43	6	131	17	421	54	181	23	776	100	0.1752
boys											
low	6	60	20	48	61	48	120	36	207	41	
high	4	40	22	52	66	52	209	63	301	59	
total	10	2	42	8	127	25	329	65	508	100	0.0542
mothers											
low	13	50	26	38	92	46	66	44	197	44	
high	13	50	43	62	108	54	84	56	248	56	
total	26	6	69	16	200	45	150	34	445	100	0.6134
girls											
low	7	44	14	37	61	47	115	46	197	46	
high	9	56	24	63	68	53	133	54	234	54	
total	16	4	38	9	129	30	248	57	431	100	0.7051

*Complexity defined as low/high: below/above mean Guttman scale score.

†Crowding index: 1 = >3, 2 = 2-3, 3 = 1-2, 4 = <1.

‡X^2 significance.

Table 12. Correlation of spouse Guttman scale scores for homogeneous* spouse pairs

group	n	r	r^2	significance†
homogeneous	74	0.3139	0.0986	0.0032
non homogeneous	32	-0.1405	0.0197	0.2216
all	106	0.1849	0.0342	0.0289

*Homogeneous pairs defined as belonging to same origin group.

†Significance of Spearman correlation coefficient.

Table 13A. Correlation of fathers' and childs' Guttman scale scores by origin group

group	n	r	r^2	significance*
Israeli	34	0.3148	0.0991	0.0349
Eu. Am.†	20	0.5023	0.2523	0.0120
Asian	31	0.1874	0.0351	0.1564
N. African	17	0.0957	0.0092	0.3574
all	102	0.2838	0.0806	0.0019

*Significance of Spearman correlation coefficient.

†Europe-American.

Table 13B. Correlation of mothers' and childs' Guttman scale scores by origin group

group	n	r	r^2	significance*
Israeli	28	-0.0097	0.0001	0.4805
Eu. Am.†	6	0.4417	0.1951	0.1902
Asian	13	-0.1164	0.0135	0.3525
N. African	7	0.3454	0.1193	0.2240
all	54	0.1045	0.0109	0.2261

*Significance of Spearman correlation coefficient.

†Europe-American.

Table 14. Effect of spouse educational consistency on dietary complexity*

group	educational consistency†						total		sig‡
	1		2		3				
	n	%	n	%	n	%	n	%	
father									
low	22	57.9	16	42.1	0	0	38	36.9	
high	38	58.5	20	30.8	7	10.8	65	63.1	
total	60	58.3	36	35.0	7	6.8	103	100.0	0.0831
mother									
low	28	63.6	13	29.5	3	6.8	44	41.7	
high	32	54.2	23	39.0	4	6.8	59	57.3	
total	60	58.3	36	35.0	7	6.8	103	100.0	0.5991

*Complexity defined as high/low: above/below mean scale score.

†Educational categories: <high school, high school, >high school
Consistency: 1 = equal, 2 = different by one degree, 3 = different by two degrees.

‡X^2 significance.

Table 15. Effect of spouse educational consistency* on Guttman scale score

group	Guttman scale score										total		sig†
	1		2		3		4		5				
	n	%	n	%	n	%	n	%	n	%	n	%	
fathers													
1	4	100	12	57	21	57	18	53	5	71	60	58	
2	0	0	9	43	14	12	12	35	1	14	36	35	
3	0	0	0	0	2	5	4	12	1	14	7	7	
total	4	4	21	20	37	36	34	33	7	7	103	100	0.4409
mothers													
1	1	50	20	71	19	54	20	54	0	0	60	58	
2	1	50	7	25	13	37	14	38	1	100	36	35	
3	0	0	1	4	3	9	3	8	0	0	7	7	
total	2	2	28	27	35	34	37	36	1	1	103	100	0.7782

*Educational categories: <high school, high school, >high school, Consistency: 1 = equal, 2 = different by one degree, 3 = different by two degrees.

†X^2significance.

Table 16. Effect of spouse origin consistency on dietary complexity*

group	origin consistency				total		sig†
	equal		not equal				
	n	%	n	%	n	%	
fathers							
low	28	71.8	11	28.2	39	37.5	
high	45	69.2	20	30.8	65	62.5	
total	73	70.2	31	29.8	104	100.0	0.9559
mothers							
low	29	65.9	15	34.1	44	42.3	
high	44	73.3	16	26.7	60	57.7	
total	73	70.2	31	29.8	104	100.0	0.5480

*Complexity defined as low/high: below/above mean Guttman scale score.

†X^2 significance.

Table 17. Effect of spouse origin consistency on Gurrman scale score

group	Guttman scale score										total		sig*
	1		2		3		4		5				
	n	%	n	%	n	%	n	%	n	%	n	%	
fathers													
equal	3	75	17	77	26	70	21	62	6	86	73	70	
not equal	1	25	5	23	11	30	13	38	1	14	31	30	
total	4	4	22	21	37	36	34	33	7	7	104	100	0.6390
mothers													
equal	2	100	18	64	26	74	27	71	0	0	73	70	
not equal	0	0	10	36	9	26	11	29	1	100	31	30	
total	2	2	28	27	35	34	38	37	1	1	104	100	0.4108

*X^2 significance.

Table 18. **Effect of spouse status consistency on dietary complexity***

group	status consistency score†								total		sig‡
	1		2		3		4				
	n	%	n	%	n	%	n	%	n	%	
fathers											
low	14	35.9	21	53.8	4	10.3	0	0	39	37.9	
high	21	32.8	30	46.9	11	17.2	2	3.1	64	62.1	
total	35	34.0	51	49.5	15	14.6	2	1.9	103	100.0	0.5080
mothers											
low	14	31.8	25	56.8	5	11.4	0	0	44	42.7	
high	21	35.6	26	44.1	10	16.9	2	3.4	59	57.3	
total	35	34.0	51	49.5	15	14.6	2	1.9	103	100.0	0.3971

*Complexity defined as low/high: below/above mean Guttman scale score.

†1 = equal, 2 = moderately consistent, 3 = inconsistent, 4 = sharply inconsistent.

‡X^2 significance.

Table 19. Effect of spouse status consistency on dietary complexity*

group	status consistency†				total		sig‡
	equal		not equal				
	n	%	n	%	n	%	
fathers							
low	35	90.0	4	10.2	39	100	
high	51	79.7	13	20.3	64	100	
total	86	83.5	17	16.5	103	100	0.1824
mothers							
low	39	88.6	5	11.4	44	100	
high	47	79.7	12	20.3	59	100	
total	86	83.5	17	16.5	103	100	0.2248
all							
low	74	89.1	9	10.8	83	100	
high	98	72.3	25	20.3	123	100	
total	172	83.4	34	16.5	206	100	0.0722

*Complexity defined as low/high: below/above mean Guttman scale score.

†Categories in table 18 combined: 1+2 = equal, 3+4 not equal.

‡X^2 significance.

APPENDIX 6

Tables for Nutrient Analysis

Table 20A. Energy intake by Guttman scale score for fathers by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	kcal	kcal	kcal	
Israeli					
1	5	1379±496	636	1944	
2	19	1852±671	825	3307	
3	68	2172±666	675	3910	
4	108	2261±713	1160	5774	
5	27	2906±746	1419	4469	
total	227	2258	636	5773	0.0001
Eu. Am.‡					
1	7	1780±389	1048	2346	
2	73	1939±626	842	3698	
3	58	2139±729	691	3943	
4	41	2202±721	1288	3916	
5	11	2447±694	1700	3865	
total	190	2080	691	3943	0.0531
Asian					
1	19	1841±688	1055	3280	
2	79	1971±644	885	3781	
3	89	2185±684	760	4736	
4	23	2812±1266	1393	7214	
5	3	3291±451	2991	3810	
total	213	2158	760	7214	0.0001
N. African					
1	4	1372±319	1010	1677	
2	34	1758±692	792	3504	
3	35	2188±792	882	4307	
4	60	2183±690	605	3703	
5	13	2894±743	1731	4107	
total	146	2126	605	4307	0.0001

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 20B. Energy intake by Guttman scale score for boys by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	kcal	kcal	kcal	
Israeli					
1	7	1876±565	855	2543	
2	15	2358±582	1282	3514	
3	52	2734±1282	673	6985	
4	55	2607±836	1122	5335	
5	13	3158±640	1885	4126	
total	142	2641	673	6985	0.0538
Eu. Am.‡					
1	0				
2	38	2551±1159	814	5446	
3	42	2738±868	1488	4891	
4	27	2910±757	1662	4300	
5	8	3377±853	1811	4817	
total	115	2761	814	5446	0.1218
Asian					
1	8	1714±649	1147	3192	
2	41	2016±743	464	3930	
3	72	2647±964	1058	6072	
4	30	2817±915	1740	6068	
5	6	3783±2889	1872	9613	
total	157	2510	464	9617	0.0001
N. African					
1	4	1802±852	1210	3062	
2	15	2234±1116	1059	5304	
3	27	2520±957	843	5553	
4	34	2425±736	1265	4429	
5	14	2979±937	1375	4932	
total	94	2478	843	5553	0.1087

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 20C. **Energy intake by Guttman scale score for mothers by origin group**

group	individuals	mean*	min. value	max. value	sig†
	n	kcal	kcal	kcal	
Israeli					
1	7	1180±386	750	1883	
2	31	1299±530	460	2947	
3	36	1694±519	655	2803	
4	67	1583±538	715	3379	
5	9	2591±1630	1550	6807	
total	150	1592	460	6807	0.0001
Eu. Am.‡					
1	3	1011±369	616	1347	
2	35	1420±613	690	4118	
3	35	1613±559	637	2833	
4	15	1823±689	827	2946	
5	3	1711±833	1034	2641	
total	91	1557	616	4118	0.1191
Asian					
1	10	1054±787	443	2836	
2	35	1287±414	577	2461	
3	45	1553±585	764	3506	
4	24	2000±647	1147	3641	
5	2	2250±730	1734	2767	
total	116	1534	443	3641	0.0001
N. African					
1	0				
2	23	1190±438	496	2151	
3	17	1418±433	656	2104	
4	41	1477±506	624	2770	
5	7	1483±538	977	2590	
total	88	1391	496	2770	0.1354

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 20D. Energy intake by Guttman scale score for girls by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	kcal	kcal	kcal	
Israeli					
1	4	1423±486	743	1882	
2	29	1301±444	455	2152	
3	40	1726±691	673	3434	
4	42	1832±940	810	6580	
5	7	2012±642	1200	2933	
total	122	1673	455	6580	0.0183
Eu. Am.‡					
1	7	1704±838	599	3206	
2	34	1324±715	989	3705	
3	33	1695±439	831	2838	
4	13	2119±852	888	3880	
5	4	2732±1041	1803	4206	
total	91	1850	599	4206	0.0333
Asian					
1	5	1083±386	608	1487	
2	26	1355±637	365	2850	
3	59	1597±603	630	3478	
4	30	2081±853	743	5445	
5	3	3734±946	2745	4631	
total	123	1695	365	5445	0.0001
N. African					
1	2	763±252	585	941	
2	8	1259±489	803	2301	
3	42	1560±569	715	3074	
4	33	1670±807	535	3848	
5	10	1993±833	1250	3956	
total	95	1602	535	3956	0.0759

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 21A. **Energy per kilogram body weight by Guttman scale score for fathers by origin group**

group	individuals	mean*	min. value	max. value	sig†
	n	kcal	kcal	kcal	
Israeli					
1	5	18.7±6.0	11.4	23.8	
2	19	25.3±10.1	7.0	46.9	
3	68	29.2±10.0	10.3	57.4	
4	108	30.7±11.3	13.7	88.1	
5	27	36.2±7.7	17.5	48.0	
total	227	30.2	7.0	88.1	0.0007
Eu. Am.‡					
1	7	24.8±7.0	15.6	37.2	
2	73	26.5±9.6	9.7	59.9	
3	58	28.6±10.3	7.9	55.3	
4	41	30.4±8.9	16.3	52.2	
5	11	32.3±9.9	21.7	51.7	
total	190	28.2	7.9	59.9	0.1229
Asian					
1	19	25.4±10.2	13.3	43.2	
2	79	27.8±9.0	10.3	50.5	
3	89	30.4±10.5	10.4	77.6	
4	23	37.9±18.2	14.7	100.2	
5	3	47.7±11.8	38.3	61.0	
total	213	30.0	10.3	100.2	0.0001
N. African					
1	4	19.6±4.9	12.9	23.3	
2	34	24.8±11.2	11.5	57.9	
3	35	29.5±11.2	14.7	56.7	
4	60	29.9±9.5	6.0	55.7	
5	13	40.0±9.	23.2	56.3	
total	146	29.2	6.0	57.9	0.0002

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 21B. **Energy per kilogram body weight by Guttman scale score for boys by origin group**

group	individuals	mean*	min. value	max. value	sig†
	n	kcal	kcal	kcal	
Israeli					
1	7	34.4±10.2	16.9	50.0	
2	15	37.7±14.0	17.8	80.8	
3	52	43.9±22.3	11.2	118.4	
4	55	41.6±14.9	12.9	86.7	
5	13	51.0±13.4	20.1	69.9	
total	142	42.5	11.2	118.4	0.1994
Eu. Am.‡					
1	0				
2	38	40.6±19.1	12.3	83.3	
3	42	42.7±15.0	17.2	78.3	
4	27	47.2±14.9	23.1	75.4	
5	8	54.2±12.2	38.0	72.7	
total	115	43.9	12.3	83.3	0.1167
Asian					
1	8	26.9±6.1	20.3	39.5	
2	41	32.8±12.5	11.3	64.1	
3	72	45.2±17.2	18.1	102.1	
4	29	45.5±13.3	28.5	86.7	
5	6	57.8±36.5	27.9	130.0	
total	156	41.6	11.3	130.0	0.0001
N. African					
1	3	34.2±12.5	26.8	48.6	
2	15	40.1±16.2	18.9	84.2	
3	27	39.1±16.5	12.2	85.4	
4	34	41.4±11.9	18.2	65.6	
5	14	48.5±14.8	18.7	65.8	
total	93	41.4	12.2	85.4	0.3130

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 21C. Energy intake per kilogram body weight by Guttman scale score for mothers by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	kcal	kcal	kcal	
Israeli					
1	7	17.7±5.2	11.7	26.2	
2	31	19.2±8.1	9.0	39.3	
3	36	25.5±7.9	10.1	50.1	
4	67	24.8±9.9	10.7	59.8	
5	9	41.8±27.1	23.3	112.5	
total	150	24.5	9.0	112.5	0.0001
Eu. Am.‡					
1	3	16.4±5.8	9.7	20.1	
2	35	22.7±10.7	7.7	66.4	
3	35	26.2±11.4	8.2	52.9	
4	15	28.4±12.6	13.8	53.1	
5	3	28.1±14.6	14.1	43.3	
total	91	25.0	7.8	66.4	0.2860
Asian					
1	10	15.9±11.5	8.3	40.5	
2	35	20.6±7.7	8.9	36.8	
3	45	24.9±9.6	9.6	55.6	
4	24	30.6±10.9	15.6	58.2	
5	2	30.0±8.8	23.7	36.2	
total	116	24.1	8.3	58.2	0.0002
N. African					
1	0				
2	23	17.9±8.4	7.0	38.1	
3	17	22.1±8.5	9.2	37.1	
4	41	21.7±7.7	6.8	38.5	
5	7	22.5±10.0	15.0	44.3	
total	88	20.8	6.8	44.3	0.2652

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 21D. **Energy per kilogram body weight by Guttman scale score for girls by origin group**

group	individuals	mean*	min. value	max. value	sig†
	n	kcal	kcal	kcal	
Israeli					
1	4	25.0±9.0	11.8	31.6	
2	29	23.0±8.5	7.5	40.0	
3	40	31.0±12.9	11.3	61.5	
4	42	33.5±16.6	16.7	115.4	
5	7	39.2±14.4	23.3	64.5	
total	122	30.2	7.5	115.4	0.0076
Eu. Am.‡					
1	7	30.9±17.0	13.0	62.2	
2	34	32.6±13.9	14.4	75.6	
3	33	30.7±9.0	15.8	55.6	
4	13	37.3±18.1	13.5	78.4	
5	4	54.0±20.6	36.4	83.3	
total	91	33.4	13.0	83.3	0.0241
Asian					
1	5	19.5±6.4	11.6	26.4	
2	26	25.1±12.6	6.8	54.8	
3	59	29.1±10.7	11.8	51.4	
4	30	37.2±14.4	11.2	84.4	
5	3	60.8±24.9	33.7	82.7	
total	123	30.6	6.8	84.4	0.0001
N. African					
1	2	13.8±5.8	9.7	17.9	
2	8	21.7±8.1	10.6	34.3	
3	42	28.5±10.9	9.6	54.4	
4	33	30.2±14.3	10.6	75.5	
5	10	37.1±15.2	20.7	71.9	
total	95	29.1	9.6	75.5	0.0439

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 22A. Percent of energy from protein by Guttman scale score for fathers by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	5	9.7±2.3	7.0	12.4	
2	19	16.5±4.6	9.7	26.5	
3	68	14.7±3.5	8.3	25.0	
4	108	14.7±3.4	8.0	26.2	
5	27	14.0±3.2	9.0	21.2	
total	227	14.6	7.1	26.3	0.0029
Eu. Am.‡					
1	7	11.9±1.7	10.3	14.5	
2	73	15.7±4.1	7.3	28.4	
3	58	15.4±4.2	5.5	28.0	
4	41	15.2±2.7	10.3	23.4	
5	11	14.9±2.4	10.9	17.6	
total	190	15.3	5.5	28.4	0.1730
Asian					
1	19	16.0±3.9	9.4	25.8	
2	79	15.4±3.8	8.0	24.2	
3	89	13.7±3.4	7.9	21.8	
4	23	12.5±2.2	9.1	17.2	
5	3	13.7±1.9	11.5	15.1	
total	213	14.4	7.9	25.8	0.0004
N. African					
1	4	10.0±3.2	7.6	14.4	
2	34	15.4±3.5	8.4	22.7	
3	35	13.7±3.6	6.1	24.6	
4	60	14.3±3.6	8.4	26.5	
5	13	13.1±4.2	7.2	20.7	
total	146	14.2	6.1	26.5	0.0335

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 22B. Percent of energy from protein by Guttman scale score for boys by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	10.1±3.0	5.9	13.1	
2	15	13.6±3.6	8.4	19.9	
3	52	13.4±2.2	8.0	19.5	
4	55	14.1±3.2	7.8	24.0	
5	13	14.0±2.9	10.5	20.0	
total	142	13.6	5.9	24.0	0.0165
Eu. Am.					
1	0				
2	38	13.1±3.7	5.1	20.8	
3	42	14.0±3.0	9.1	21.3	
4	27	13.7±3.1	8.2	21.5	
5	8	12.7±3.3	9.1	17.5	
total	115	13.5	5.1	21.5	0.5992
Asian					
1	8	13.9±2.0	12.0	17.1	
2	41	15.1±3.5	8.6	23.8	
3	72	12.9±2.7	7.9	23.1	
4	30	12.4±2.8	7.3	19.2	
5	6	11.4±1.9	8.6	13.8	
total	157	13.4	7.3	23.8	0.0002
N. African					
1	4	9.3±2.7	6.5	12.0	
2	15	13.8±5.2	6.7	24.9	
3	27	12.2±2.5	6.5	17.5	
4	34	13.1±2.4	9.5	19.3	
5	14	13.3±2.1	10.0	16.8	
total	94	12.8	6.5	24.9	0.0834

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 22C: Percent of energy from protein by Guttman scale score for mothers in origin group

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	13.2±2.5	11.1	17.8	
2	31	15.5±4.1	7.2	24.5	
3	36	14.5±3.2	8.2	24.0	
4	67	15.8±3.8	8.5	27.4	
5	9	13.0±3.0	8.9	18.0	
total	150	15.2	7.2	27.4	0.0631
Eu. Am.‡					
1	3	11.9±1.5	10.9	13.7	
2	35	15.0±4.0	4.5	26.1	
3	35	15.4±3.9	8.4	26.4	
4	15	15.8±3.5	9.6	22.0	
5	3	15.6±2.3	13.7	18.2	
total	91	15.2	4.5	26.4	0.6015
Asian					
1	10	16.0±5.5	7.9	26.7	
2	35	15.2±3.0	8.3	22.2	
3	45	14.2±3.2	9.1	20.8	
4	24	12.8±2.7	6.7	17.9	
5	2	13.7±1.3	12.8	14.6	
total	116	14.3	6.7	26.7	0.0379
N. African					
1	0				
2	23	16.3±4.0	8.4	26.6	
3	17	14.3±3.0	9.1	18.4	
4	41	15.6±3.8	9.4	24.0	
5	7	13.1±2.6	10.3	17.0	
total	88	15.3	8.4	26.6	0.1329

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 22D. Percent of energy from protein by Guttman scale score for girls by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	4	14.5±4.2	11.3	20.2	
2	29	15.2±4.4	9.7	28.5	
3	40	13.3±4.0	6.9	21.2	
4	42	13.9±3.0	9.5	21.3	
5	7	12.8±4.0	5.7	19.1	
total	122	14.0	5.7	28.5	0.3045
Eu. Am.‡					
1	7	10.4±1.8	7.2	12.0	
2	34	14.0±4.1	8.3	25.2	
3	33	14.6±3.2	10.0	23.4	
4	13	14.4±3.7	9.7	22.3	
5	4	12.7±1.9	10.9	14.9	
total	91	14.0	7.2	25.2	0.0691
Asian					
1	5	15.2±2.5	12.3	19.2	
2	26	15.2±4.8	6.6	26.7	
3	59	13.2±3.3	5.3	20.1	
4	30	12.0±2.6	4.3	18.6	
5	3	9.7±2.3	7.4	11.9	
total	123	13.4	4.3	26.7	0.0031
N. African					
1	2	8.8±0.7	8.3	9.3	
2	8	13.1±2.9	8.6	16.4	
3	42	11.9±2.9	7.4	17.9	
4	33	12.7±3.0	6.8	19.2	
5	10	13.8±1.5	11.3	16.3	
total	95	12.4	6.8	19.2	0.1124

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 23A: Percent of energy from fat by Guttman scale score for fathers by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	5	38.0±16.0	21.2	63.2	
2	19	30.9±10.8	17.7	60.9	
3	68	32.6±8.9	12.9	60.3	
4	108	34.5±8.7	16.2	60.3	
5	27	38.5±9.7	24.4	63.6	
total	227	34.2	12.9	63.6	0.0273
Eu. Am.‡					
1	7	26.6±9.7	10.1	41.0	
2	73	31.4±9.4	8.9	49.9	
3	58	35.6±10.3	19.1	68.5	
4	41	34.6±9.8	15.6	61.9	
5	11	36.1±10.6	16.5	47.7	
total	190	33.5	8.9	68.5	0.0331
Asian					
1	19	24.0±11.0	7.1	48.2	
2	79	31.6±10.2	11.1	65.9	
3	89	32.2±9.3	5.9	54.0	
4	23	33.4±6.4	15.6	42.0	
5	3	42.4±11.4	34.3	55.4	
total	213	31.5	5.9	65.9	0.0027
N. African					
1	4	18.8±4.6	15.7	25.7	
2	34	26.5±10.6	13.7	64.4	
3	35	33.7±11.1	13.1	56.7	
4	60	31.5±9.4	14.1	57.0	
5	13	34.5±10.8	21.0	56.1	
total	146	30.8	13.1	64.4	0.0036

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 23B. Percent of energy from fat by Guttman scale score for boys by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	33.4±15.8	19.4	60.6	
2	15	32.6±9.8	16.9	52.1	
3	52	34.1±9.3	17.7	52.1	
4	55	33.7±9.5	12.4	58.2	
5	13	40.8±8.4	31.8	54.6	
total	142	34.4	12.4	60.6	0.1716
Eu. Am.‡					
1	0				
2	38	32.7±9.4	16.1	57.6	
3	42	34.4±8.3	19.2	55.4	
4	27	33.5±7.2	20.5	48.7	
5	8	35.4±6.2	24.3	44.7	
total	115	33.7	16.1	57.6	0.7634
Asian					
1	8	29.0±10.8	20.3	46.9	
2	41	29.8±9.6	13.0	54.7	
3	72	30.8±9.1	15.2	54.7	
4	30	35.2±8.1	11.1	52.1	
5	6	33.7±4.7	25.5	38.2	
total	157	31.4	11.1	54.7	0.1044
N. African					
1	4	31.1±13.5	17.1	46.0	
2	15	26.1±10.6	8.2	40.6	
3	27	31.3±9.3	18.5	56.0	
4	34	31.1±8.2	17.5	51.6	
5	14	38.4±8.0	26.2	50.5	
total	94	31.5	8.2	56.0	0.0133

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 23C. **Percent of energy from fat by Guttman scale score for mothers by origin group**

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	28.6±13.4	7.8	51.3	
2	31	34.5±10.1	11.6	61.6	
3	36	36.5±6.8	22.0	49.4	
4	67	36.7±9.0	18.6	60.6	
5	9	40.2±9.2	20.4	48.7	
total	150	36.0	7.8	61.6	0.0959
Eu. Am.‡					
1	3	22.4±2.5	19.7	24.7	
2	35	31.3±11.1	13.8	50.2	
3	35	36.3±8.4	23.4	60.4	
4	15	35.4±6.7	19.2	45.7	
5	3	30.9±3.4	27.7	34.5	
total	91	33.6	13.8	60.4	0.0417
Asian					
1	10	20.1±12.0	4.2	35.7	
2	35	32.6±11.3	9.8	58.9	
3	45	35.0±9.5	16.2	62.8	
4	24	36.9±8.6	17.7	53.7	
5	2	37.0±2.6	35.2	38.9	
total	116	33.4	4.2	62.8	0.0005
N. African					
1	0				
2	23	29.4±10.7	8.0	49.3	
3	17	35.3±6.3	26.0	49.5	
4	41	33.3±8.5	18.6	59.4	
5	7	36.1±8.3	24.4	45.8	
total	88	32.9	8.0	59.4	0.1170

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 23D. Percent of energy from fat by Guttman scale score for girls by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	4	29.1±3.0	27.2	33.6	
2	29	34.2±9.8	14.7	51.5	
3	40	34.7±10.0	17.5	57.8	
4	42	35.5±9.2	15.5	54.1	
5	7	40.1±11.1	27.0	61.8	
total	122	35.0	14.7	61.8	0.4279
Eu. Am.‡					
1	7	27.3±13.5	16.7	51.1	
2	34	32.1±10.2	13.7	54.8	
3	33	35.6±8.0	12.5	50.2	
4	13	37.9±3.8	31.6	42.8	
5	4	37.2±6.3	28.3	43.3	
total	91	34.1	12.5	54.8	0.0612
Asian					
1	5	20.0±10.9	8.1	33.2	
2	26	29.9±9.2	9.8	52.6	
3	59	32.7±10.8	11.3	56.8	
4	30	39.0±8.5	22.8	59.0	
5	3	35.5±3.0	32.7	38.7	
total	123	33.2	8.1	59.0	0.0004
N. African					
1	2	33.1±2.8	31.2	35.1	
2	8	33.1±7.1	23.1	42.5	
3	42	32.4±9.6	17.8	60.0	
4	33	33.7±8.6	17.2	48.9	
5	10	40.6±7.4	26.8	52.9	
total	95	33.8	17.2	60.0	0.1399

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 24A. Percent of energy from saturated fat by Guttman scale score for fathers by origin group

group	individuals	mean*	min. value	max. value	sig+
	n	%	%	%	
Israeli					
1	5	15.4±8.5	7.8	29.1	
2	19	10.3±4.2	3.4	19.4	
3	68	9.8±3.5	3.4	18.3	
4	108	10.2±3.4	3.5	20.1	
5	27	10.5±4.7	5.3	25.4	
total	227	10.2	3.4	29.1	0.0382
Eu. Am.‡					
1	7	10.4±6.0	1.7	21.3	
2	73	10.1±3.5	3.5	20.5	
3	58	11.7±4.3	4.4	22.5	
4	41	9.8±3.4	5.6	17.9	
5	11	13.0±2.4	7.9	15.6	
total	190	10.7	1.7	22.5	0.0160
Asian					
1	19	10.0±5.0	3.0	19.3	
2	79	9.6±3.5	3.0	18.6	
3	89	9.6±3.7	0.8	21.2	
4	23	9.2±2.4	5.1	13.7	
5	3	13.8±1.8	11.9	15.5	
total	213	9.7	0.8	21.2	0.3610
N. African					
1	4	7.4±1.6	5.0	8.6	
2	34	9.1±4.0	2.9	22.1	
3	35	10.1±4.9	2.1	21.5	
4	60	9.4±3.6	3.1	19.23	
5	13	8.6±3.0	4.5	14.9	
total	146	9.4	2.1	22.5	0.5862

*Mean±standard deviation.

+One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 24B. Percent of energy from saturated fat by Guttman scale for boys by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	9.6±3.8	5.7	16.5	
2	15	11.4±4.1	4.2	17.7	
3	52	10.7±3.5	4.1	19.7	
4	55	10.2±3.8	3.4	20.0	
5	13	12.1±4.6	7.4	24.4	
total	142	10.6	3.4	24.4	0.4242
Eu. Am.					
1	0				
2	38	9.4±3.4	4.1	18.0	
3	42	10.9±3.0	5.5	18.6	
4	27	9.6±2.9	4.7	17.7	
5	8	11.9±2.5	6.8	14.9	
total	115	10.2	4.1	18.6	0.0482
Asian					
1	8	9.8±4.3	3.2	15.8	
2	41	9.2±3.8	2.7	18.6	
3	72	9.7±3.9	3.2	20.0	
4	30	9.3±3.4	2.7	21.1	
5	6	9.2±3.0	5.9	14.3	
total	157	9.5	2.7	21.1	0.9574
N. African					
1	4	5.9±1.9	3.9	8.5	
2	15	8.3±3.7	2.8	15.3	
3	27	8.6±3.6	3.6	17.1	
4	34	9.0±3.4	4.0	19.1	
5	14	9.6±3.8	6.1	18.2	
total	94	8.7	2.8	19.1	0.4319

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 24C. Percent of energy from saturated fat by Guttman scale score for mothers by origin group

group	individuals	mean*	min. value	max. value	sig
	n	%	%	%	
Israeli					
1	7	9.8±6.7	1.5	23.2	
2	31	11.8±4.3	2.1	21.8	
3	36	11.5±2.8	5.4	18.5	
4	67	11.2±2.9	5.8	19.7	
5	9	11.1±4.4	4.5	20.2	
total	150	11.3	1.6	23.2	0.7394
Eu. Am.					
1	3	8.1±2.8	4.9	10.3	
2	35	10.5±4.2	2.2	18.2	
3	35	12.4±3.7	7.0	20.5	
4	15	11.8±3.8	7.3	20.1	
5	3	12.7±2.1	10.5	14.7	
total	91	11.4	2.2	20.5	0.1695
Asian					
1	10	8.2±5.6	1.4	15.4	
2	35	10.6±4.1	2.9	18.7	
3	45	11.0±3.1	4.6	19.4	
4	24	10.3±3.2	5.8	16.8	
5	2	13.2±3.3	10.9	15.5	
total	116	10.5	1.4	19.4	0.2237
N. African					
1	0				
2	23	10.5±4.6	0.9	19.4	
3	17	10.4±2.9	6.3	17.1	
4	41	9.9±3.4	4.3	17.8	
5	7	7.7±1.4	5.7	9.9	
total	88	10.0	0.9	19.4	0.3162

*Mean±standard deviation.

One way analysis of variance (ANOVA) signifcance.

Europe-American.

Table 24D. Percent of energy from saturated far by Guttman scale score for girls by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	4	11.8±4.8	6.3	17.6	
2	29	12.3±4.1	5.3	25.7	
3	40	10.5±4.2	4.3	23.0	
4	42	11.1±3.6	3.5	19.0	
5	7	11.3±3.5	5.5	15.6	
total	122	11.2	3.5	25.7	0.4656
Eu. Am.‡					
1	7	8.4±2.6	4.7	12.0	
2	34	10.3±3.7	4.2	20.2	
3	33	11.7±3.3	4.8	19.9	
4	13	11.2±2.1	7.2	15.2	
5	4	12.7±0.9	11.6	13.5	
total	91	10.9	4.2	20.2	0.0768
Asian					
1	5	8.2±5.2	3.1	14.5	
2	26	10.4±4.1	2.1	20.8	
3	59	9.6±3.7	2.5	19.4	
4	30	9.8±2.8	5.2	16.5	
5	3	10.8±1.6	9.1	12.1	
total	123	9.8	2.1	20.8	0.6785
N. African					
1	2	10.5±1.2	9.6	11.2	
2	8	9.9±3.2	5.4	14.4	
3	42	9.7±3.8	3.3	19.6	
4	33	9.5±3.1	4.1	16.9	
5	10	10.4±3.1	5.9	14.0	
total	95	9.8	3.3	19.6	0.9579

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 25A. Percent of energy from monounsaturated fat by Guttman scale score for fathers by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	5	11.6±6.2	5.2	21.7	
2	19	10.4±4.3	4.6	19.3	
3	68	11.0±3.9	3.3	21.5	
4	108	12.0±3.6	3.9	22.0	
5	27	14.0±4.6	8.7	28.5	
total	227	11.8	3.3	28.5	0.0073
Eu. Am.‡					
1	7	7.4±3.2	2.0	12.3	
2	73	10.7±4.0	2.1	21.8	
3	58	12.0±4.7	5.2	30.5	
4	41	12.1±3.8	4.6	22.7	
5	11	11.8±4.6	4.9	19.1	
total	190	11.4	2.0	30.5	0.0291
Asian					
1	19	8.9±5.4	1.8	22.9	
2	79	10.6±4.2	2.2	23.2	
3	89	11.1±4.2	1.1	23.3	
4	23	11.4±2.3	6.4	16.2	
5	3	15.6±4.8	11.4	20.8	
total	213	10.8	1.1	23.3	0.0575
N. African					
1	4	4.5±1.8	2.6	6.9	
2	34	8.6±4.8	1.9	26.5	
3	35	11.9±4.9	3.8	22.4	
4	60	11.2±4.3	4.3	23.2	
5	13	13.2±5.2	7.1	25.3	
total	146	10.8	1.9	26.5	0.0006

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 25B. Percent of energy from monounsaturated fat by Guttman scale score for boys by origin

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	12.6±8.2	5.9	26.0	
2	15	12.0±4.7	6.2	24.1	
3	52	11.8±3.8	5.0	20.5	
4	55	11.9±4.0	3.9	25.5	
5	13	14.4±2.7	9.9	20.1	
total	142	12.2	3.9	26.0	0.3596
Eu. Am.‡					
1	0				
2	38	11.6±4.2	5.5	24.6	
3	42	12.5±3.4	6.4	20.1	
4	27	11.4±3.0	7.0	18.5	
5	8	12.5±3.2	8.7	16.8	
total	115	11.9	5.5	24.6	0.5609
Asian					
1	8	10.5±7.1	4.5	23.9	
2	40	9.4±4.1	3.4	19.0	
3	72	10.9±4.1	4.9	22.4	
4	30	12.1±3.3	3.0	22.0	
5	6	10.4±1.1	8.4	11.4	
total	156	10.7	3.0	23.9	0.1168
N. African					
1	4	8.9±4.4	4.0	14.6	
2	15	8.2±4.2	1.7	16.6	
3	27	10.8±4.3	5.5	21.5	
4	34	10.5±3.6	5.4	19.0	
5	14	13.9±4.2	7.1	20.4	
total	94	10.7	1.7	21.5	0.0075

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 25C. Percent of energy from monounsaturated fat by Guttman scale score for mothers by origin group

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	10.6±5.8	3.6	18.7	
2	31	11.2±4.1	2.4	18.4	
3	36	12.1±3.3	5.9	20.4	
4	67	12.7±3.6	4.5	21.6	
5	9	14.7±4.3	6.1	18.4	
total	150	12.3	2.4	21.6	0.0981
Eu. Am.‡					
1	3	8.1±1.5	7.1	9.7	
2	35	10.5±4.4	4.2	19.7	
3	35	12.3±3.9	6.3	23.2	
4	15	11.4±2.9	5.6	15.7	
5	3	9.8±1.6	8.1	11.1	
total	91	11.3	4.2	23.2	0.1846
Asian					
1	10	6.3±4.3	1.0	12.8	
2	35	11.6±5.2	1.8	22.0	
3	45	12.0±3.6	6.1	19.9	
4	24	13.1±4.4	5.4	25.9	
5	2	10.9±1.7	9.7	12.0	
total	116	11.6	1.0	25.9	0.0020
N. African					
1	0				
2	23	9.4±4.7	1.4	19.6	
3	17	12.1±3.3	8.6	19.7	
4	41	11.9±3.8	5.5	20.7	
5	7	12.2±3.4	7.9	18.2	
total	88	11.3	1.4	20.7	0.0602

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 25D. Percent of energy from monounsaturated fat by Guttman scale score for girls by origin

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	4	10.1±1.3	8.9	11.9	
2	29	11.7±4.4	3.7	21.4	
3	40	12.5±5.0	4.8	24.9	
4	42	12.3±3.7	5.6	21.5	
5	7	13.1±2.3	9.2	16.0	
total	122	12.2	3.7	24.9	0.7391
Eu. Am.‡					
1	7	9.9±5.3	5.6	18.7	
2	34	11.1±4.2	3.5	21.0	
3	33	12.1±3.3	3.7	19.3	
4	13	12.8±2.8	8.9	19.5	
5	4	12.7±2.4	9.4	15.0	
total	91	11.7	3.5	21.0	0.3937
Asian					
1	5	6.8±4.0	2.0	10.7	
2	26	9.8±4.6	2.7	21.3	
3	59	11.4±4.4	2.6	22.9	
4	30	13.4±3.3	6.2	20.6	
5	3	12.5±2.4	9.3	14.4	
total	123	11.4	2.0	22.9	0.0029
N. African					
1	2	10.9±1.6	9.8	12.1	
2	8	10.5±3.8	6.7	16.1	
3	42	11.4±3.8	5.7	19.8	
4	33	12.1±3.8	5.1	19.1	
5	10	13.9±3.5	8.9	18.5	
total	95	11.8	5.1	19.8	0.3083

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 26A. Percent of energy from polyunsaturated fat by Guttman scale score for fathers by origin group

group	individuals	mean*	min. value	max. value	sig[r]
	n	%	%	%	
Israeli					
1	5	7.6±3.3	3.8	11.5	
2	19	7.5±5.9	2.0	28.4	
3	63	9.0±4.6	2.2	29.6	
4	108	9.2±4.1	1.5	21.3	
5	27	10.8±4.3	4.7	21.1	
total	227	9.1	1.5	29.6	0.1499
Eu. Am.[‡]					
1	7	5.2±2.0	2.3	8.2	
2	73	7.8±4.3	0.9	21.4	
3	58	8.5±3.4	2.0	18.6	
4	41	9.5±4.6	2.8	26.4	
5	11	7.9±4.2	1.9	13.0	
total	190	8.3	0.9	26.4	0.0666
Asian					
1	19	2.7±1.6	0.7	5.9	
2	79	8.6±5.1	2.0	31.5	
3	89	8.6±3.7	2.4	24.2	
4	23	10.0±4.1	2.8	21.3	
5	3	9.5±5.0	5.4	15.0	
total	213	8.2	0.7	24.2	0.0001
N. African					
1	4	5.0±4.4	2.5	11.6	
2	34	6.3±3.6	1.2	16.8	
3	35	9.0±3.5	3.4	14.6	
4	60	7.9±3.6	1.4	23.5	
5	13	9.6±3.5	5.0	16.3	
total	146	7.9	1.2	23.5	0.0057

*Mean±standard deviation.

[r]One way analysis of variance (ANOVA) signifcance.

[‡]Europe-American.

Table 26B. Percent of emergy from polyunsaturated fat by Guttman scale score for boys by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	8.5±4.2	2.3	14.8	
2	15	6.6±3.5	1.5	16.0	
3	52	8.8±4.4	2.9	24.1	
4	55	8.6±3.3	2.9	16.9	
5	13	11.2±4.7	5.3	22.8	
total	142	8.7	1.5	24.1	0.0540
Eu. Am.‡					
1	0				
2	38	8.9±4.5	2.3	21.8	
3	42	7.9±4.4	2.5	26.8	
4	27	9.2±4.3	3.7	22.5	
5	8	7.9±2.1	5.2	11.3	
total	115	8.6	2.3	26.8	0.5662
Asian					
1	8	6.7±4.3	1.2	13.7	
2	41	8.3±4.8	1.8	22.9	
3	72	7.5±3.8	2.2	20.1	
4	30	11.1±5.3	2.5	22.1	
5	6	11.2±2.2	8.5	13.6	
total	157	8.5	1.2	22.9	0.0019
N. African					
1	4	14.1±7.7	5.9	21.3	
2	15	7.2±4.7	1.1	17.0	
3	27	9.3±3.7	4.2	19.2	
4	34	8.7±3.3	2.0	15.9	
5	14	12.1±3.2	6.4	16.1	
total	94	9.4	1.1	21.3	0.0018

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 26C. Percent of energy from polyunsaturated fat by Guttman scale score for mothers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	5.8±3.3	1.4	11.2	
2	31	8.4±4.3	1.1	17.9	
3	36	9.8±3.4	4.4	18.2	
4	67	9.5±4.9	1.2	25.4	
5	9	11.3±3.5	6.6	16.8	
total	150	9.3	1.1	25.4	0.0731
Eu. Am.‡					
1	3	4.0±1.6	2.1	4.9	
2	35	7.2±3.8	1.2	14.6	
3	35	8.0±4.2	2.2	23.4	
4	15	8.6±4.4	2.0	15.9	
5	3	5.2±2.8	2.2	7.7	
total	91	7.6	1.2	23.4	0.2865
Asian					
1	10	3.2±3.3	0.6	11.9	
2	35	7.5±4.7	1.4	21.2	
3	45	9.0±5.5	2.0	30.5	
4	24	10.4±4.8	4.6	23.7	
5	2	10.7±3.9	7.9	13.4	
total	116	8.4	0.6	30.5	0.0027
N. African					
1	0				
2	23	6.7±3.1	1.3	13.2	
3	17	10.0±4.4	3.1	18.0	
4	41	8.1±3.9	2.0	20.0	
5	7	12.6±4.2	6.8	20.2	
total	88	8.5	1.3	20.2	0.0024

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 26D. Percent of energy from polyunsaturated fat by Guttman scale score for girls by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	4	4.4±2.1	2.3	6.2	
2	29	7.2±3.9	1.3	16.6	
3	40	8.8±3.4	2.6	17.9	
4	42	8.8±4.7	1.9	23.1	
5	7	12.4±9.3	7.0	32.7	
total	122	8.5	1.3	32.7	0.0240
Eu. Am.‡					
1	7	6.7±6.7	1.1	17.2	
2	34	7.9±4.4	0.6	22.8	
3	33	8.3±3.7	1.3	17.6	
4	13	10.3±3.0	5.4	16.0	
5	4	8.8±3.1	4.6	12.0	
total	91	8.3	0.6	22.8	0.3538
Asian					
1	5	2.4±1.3	0.9	3.9	
2	26	6.8±3.1	1.8	12.8	
3	59	8.8±5.0	2.3	26.9	
4	30	12.7±6.3	5.3	30.3	
5	3	9.3±1.5	7.6	10.5	
total	123	9.1	0.9	30.3	0.0001
N. African					
1	2	9.5±2.8	7.5	11.4	
2	8	9.9±3.1	6.7	15.1	
3	42	8.5±5.2	2.7	30.4	
4	33	8.7±4.1	2.7	21.4	
5	10	12.8±3.1	8.0	17.7	
total	95	9.2	2.7	30.4	0.1036

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 27A. Dietary P/S ratio* by Guttman scale for fathers by origin group

group	individuals	mean†	min. value	max. value	sig‡
	n	%	%	%	
Israeli					
1	5	0.63±0.49	0.24	1.48	
2	19	0.88±0.68	0.13	2.10	
3	68	1.07±0.69	0.18	3.13	
4	108	0.99±0.50	0.16	2.27	
5	27	1.23±.68	0.20	2.79	
total	227	1.02	0.13	3.13	0.1249
Eu. Am.#					
1	7	0.83±0.85	0.18	2.67	
2	73	0.86±0.60	0.08	3.00	
3	58	0.82±0.40	0.15	1.81	
4	41	1.03±0.49	0.33	2.42	
5	11	0.59±0.28	0.17	1.03	
total	190	0.87	0.08	3.00	0.1016
Asian					
1	19	0.31±0.17	0.11	0.76	
2	79	1.00±0.68	0.15	3.45	
3	89	1.06±0.65	0.23	3.10	
4	23	1.17±0.64	0.30	3.14	
5	3	0.68±0.29	0.38	0.97	
total	213	0.98	0.11	3.45	0.0001
N. African					
1	4	0.84±1.00	0.30	2.34	
2	34	0.85±0.71	0.16	3.05	
3	35	1.13±0.71	0.18	2.88	
4	60	0.96±0.50	0.19	2.27	
5	13	1.17±0.39	0.73	1.82	
total	146	0.99	0.16	3.05	0.2719

*Ratio of polyunsaturated fatty acids to saturated fatty acids.

†Mean±standard deviation.

‡One way analysis of variance (ANOVA) signifcance.

#Europe-American.

Table 27B. Dietary P/S ratio* by Guttman scale score for boys by origin group.

group	individuals	mean†	min. value	max. value	sig‡
	n	%	%	%	
Israeli					
1	7	0.91±0.36	0.33	1.38	
2	15	0.67±0.49	0.16	2.09	
3	52	0.90±0.49	0.16	2.54	
4	55	0.93±0.44	0.23	2.16	
5	13	1.03±0.46	0.22	2.01	
total	142	0.90	0.16	2.54	0.3097
Eu. Am.#					
1	0				
2	38	1.08±0.71	0.22	3.00	
3	42	0.77±0.46	0.15	2.65	
4	27	1.04±0.53	0.26	2.76	
5	8	0.69±0.23	0.40	1.11	
total	115	0.93	0.15	3.00	0.0458
Asian					
1	8	0.99±1.02	0.10	3.23	
2	40	1.06±0.68	0.11	3.04	
3	72	0.91±0.61	0.16	3.01	
4	30	1.38±0.90	0.17	4.45	
5	6	1.31±0.40	0.61	1.86	
total	156	1.06	0.10	4.48	0.0428
N. African					
1	4	2.38±1.07	1.08	3.68	
2	15	0.97±0.72	0.15	2.48	
3	27	1.28±0.65	0.30	2.56	
4	34	1.10±0.60	0.14	3.09	
5	14	1.41±0.53	0.45	2.32	
total	94	1.23	0.14	3.68	0.0026

*Ratio of polyunsaturated fatty acids to unsaturated fatty acids.

†Mean±standard deviation.

‡One way analysis of variance (ANOVA) signifcance.

#Europe-American.

Table 27C. Dietary P/S ratio* by Guttman scale score for mothers origin group.

group	individuals	mean†	min. value	max. value	sig‡
	n	%	%	%	
Israeli					
1	7	0.72±0.35	0.23	1.21	
2	31	0.83±0.58	0.07	2.48	
3	36	0.92±0.43	0.28	2.04	
4	67	0.91±0.59	0.12	4.30	
5	9	1.2±0.50	0.42	1.80	
total	150	0.90	0.07	4.30	0.4977
Eu. Am.#					
1	3	0.58±0.40	0.21	1.00	
2	35	0.78±0.45	0.10	2.24	
3	35	0.72±0.45	0.12	2.01	
4	15	0.85±0.59	0.10	2.17	
5	3	0.43±0.24	0.15	0.59	
total	91	0.75	0.10	2.24	0.6060
Asian					
1	10	0.50±0.42	0.09	1.51	
2	35	0.79±0.54	0.16	2.44	
3	45	0.87±0.59	0.26	2.77	
4	24	1.12±0.63	0.29	2.53	
5	2	0.87±0.51	0.51	1.23	
total	116	0.87	0.09	2.77	0.0528
N. African					
1	0				
2	23	0.80±0.65	0.11	3.40	
3	17	1.09±0.66	0.23	2.43	
4	41	0.91±0.53	0.25	2.59	
5	7	1.64±0.43	1.06	2.32	
total	88	0.97	0.11	3.40	0.0039

*Ratio of polyunsaturated fatty acids to saturated fatty acids.

†Mean±standard deviation.

‡One way analysis of variance (ANOVA) signifcance.

#Europe-American.

Table 27D. Dietary P/S ratio* by Guttman scale score for girls origin group.

group	individuals	mean†	min. value	max. value	sig‡
	n	%	%	%	
Israeli					
1	4	0.49±0.40	0.16	0.99	
2	29	0.64±0.40	0.13	1.84	
3	40	0.96±0.45	0.20	1.85	
4	42	0.87±0.53	0.20	3.07	
5	7	1.22±1.02	0.47	3.40	
total	122	0.85	0.13	3.40	0.0160
Eu. Am.#					
1	7	0.83±0.74	0.10	2.11	
2	34	0.84±0.52	0.90	2.19	
3	33	0.75±0.39	0.19	1.70	
4	13	0.99±0.48	0.40	2.22	
5	4	0.69±0.21	0.40	0.91	
total	91	0.82	0.09	2.22	0.6306
Asian					
1	5	0.35±0.18	0.13	0.54	
2	26	0.76±0.45	0.13	2.05	
3	59	1.00±0.56	0.18	2.48	
4	30	1.43±0.82	0.45	3.76	
5	3	0.86±0.07	0.81	0.93	
total	123	1.02	0.13	3.76	0.0002
N. African					
1	2	0.89±0.16	0.78	1.01	
2	8	1.12±0.50	0.53	1.71	
3	42	1.03±0.69	0.14	2.85	
4	33	0.99±0.50	0.22	2.32	
5	10	1.29±0.37	0.66	2.06	
total	95	1.05	0.14	2.85	0.6732

*Ratio of polyunsaturated fatty acids to saturated fatty acids.

†Mean±standard deviation.

‡One way analysis of variance (ANOVA) signifcance.

#Europe-American.

Table 28A. Dietary cholesterol intake by Guttman scale score for fathers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mg	mg	mg	
Israeli					
1	5	356±674	20	1560	
2	19	251±169	26	636	
3	68	265±214	18	1550	
4	108	598±277	198	1942	
5	27	705±362	208	2121	
total	227	477	18	2121	0.0001
Eu. Am.‡					
1	7	255±292	13	759	
2	73	252±221	29	1456	
3	58	581±303	84	1604	
4	41	616±354	136	1739	
5	11	675±234	407	1120	
total	190	455	13	1739	0.0001
Asian					
1	19	265±211	45	750	
2	79	412±280	22	1083	
3	89	452±335	0	1637	
4	23	457±326	114	1063	
5	3	887±16	874	905	
total	213	427	0	1637	0.0114
N. African					
1	4	42±42	0	89	
2	34	198±233	10	1395	
3	35	284±215	43	1217	
4	60	549±297	83	2006	
5	13	628±172	294	945	
total	146	397	0	2006	0.0001

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 28B. Dietary cholesterol intake by Guttman scale score for boys by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mg	mg	mg	
Israeli					
1	7	332±462	3	1039	
2	15	327±312	47	1281	
3	52	301±191	77	963	
4	55	693±337	109	1685	
5	13	633±284	199	1379	
total	142	488	3	1685	<0.0001
Eu. Am.					
1	0				
2	38	298±166	68	691	
3	42	598±266	132	1400	
4	27	684±313	359	1747	
5	8	886±323	374	1477	
total	115	539	68	1747	<0.0001
Asian					
1	8	114±45	66	186	
2	41	401±342	5	1547	
3	72	491±323	0	1372	
4	30	398±319	0	1374	
5	6	473±304	25	748	
total	157	430	0	1547	0.0280
N. African					
1	4	49±71	0	153	
2	15	324±438	9	1379	
3	27	267±191	29	672	
4	34	534±286	117	1353	
5	14	575±241	156	1232	
total	94	409	0	1379	< 0.0001

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 28C. Dietary cholesterol intake by Guttman scale score for mothers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mg	mg	mg	
Israeli					
1	7	65±72	3	215	
2	31	207±170	7	659	
3	36	268±156	76	832	
4	67	479±212	76	1541	
5	9	444±131	206	677	
total	150	351	3	1541	<0.0001
Eu. Am.‡					
1	3	73±34	45	111	
2	35	197±164	0	790	
3	35	498±286	92	1268	
4	15	542±166	141	807	
5	3	410±22	384	425	
total	91	373	0	1268	<0.0001
Asian					
1	10	224±171	7	504	
2	35	296±239	27	1039	
3	45	324±192	54	676	
4	24	313±208	28	853	
5	2	200±44	169	231	
total	116	303	7	1039	0.6456
N. African					
1	0				
2	23	145±166	20	840	
3	17	158±65	22	294	
4	41	448±219	121	1340	
5	7	387±90	247	518	
total	88	308	20	1340	<0.0001

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 28D. Dietary cholesterol intake by Guttman scale score for girls by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mg	mg	mg	
Israeli					
1	4	258±186	81	469	
2	29	190±195	46	990	
3	40	198±144	2	781	
4	42	512±253	159	1690	
5	7	535±330	123	1158	
total	122	325	2	1690	<0.0001
Eu. Am.‡					
1	7	212±258	55	785	
2	34	248±219	30	1044	
3	33	457±207	123	868	
4	13	649±256	355	1170	
5	4	741±297	409	1120	
total	91	400	30	1170	<0.0001
Asian					
1	5	186±295	29	711	
2	26	230±211	0	812	
3	59	337±249	5	1134	
4	30	353±323	76	1685	
5	3	330±77	248	400	
total	123	312	0	1685	0.2940
N. African					
1	2	65±35	41	90	
2	8	190±200	34	618	
3	42	188±158	23	884	
4	33	399±230	70	1054	
5	10	585±171	401	863	
total	95	301	23	1054	<0.0001

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 29A. Percent of energy from carbohydrate by Guttman scale score for fathers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	5	52.3±15.0	27.5	67.1	
2	19	51.5±11.2	29.4	70.4	
3	68	51.4±9.8	30.6	76.9	
4	108	48.7±9.2	25.1	70.4	
5	27	45.3±10.7	11.4	61.5	
total	227	49.4	11.4	76.9	0.0630
Eu. Am.‡					
1	7	61.4±10.0	44.6	76.2	
2	73	51.6±10.2	25.3	75.8	
3	58	48.0±10.6	26.0	68.3	
4	41	49.5±9.7	23.0	68.0	
5	11	46.9±11.4	34.0	69.6	
total	190	50.2	23.0	76.2	0.0099
Asian					
1	19	53.5±14.8	15.5	69.0	
2	79	50.3±11.2	24.0	74.1	
3	89	51.6±10.7	22.8	81.8	
4	23	49.3±7.2	30.8	62.9	
5	3	42.7±8.4	33.1	48.2	
total	213	50.9	15.5	81.8	0.4409
N. African					
1	4	63.7±4.4	57.7	67.2	
2	34	54.6±10.4	20.0	74.6	
3	35	49.1±12.1	22.4	70.8	
4	60	49.0±10.6	27.0	70.8	
5	13	43.6±8.9	30.2	59.6	
total	146	50.3	20.0	74.60	0.0019

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 29B. Percent of energy from carbohydrate by Guttman scale score for boys by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	56.5±13.4	32.7	68.4	
2	15	53.7±10.1	31.7	64.2	
3	52	52.4±9.3	33.3	70.5	
4	55	51.9±10.1	27.9	76.7	
5	13	44.8±7.5	33.8	57.4	
total	142	51.9	27.9	76.7	0.0626
Eu. Am.‡					
1	0				
2	38	53.6±10.0	33.6	71.0	
3	42	51.3±9.1	35.3	67.9	
4	27	52.4±8.0	37.5	68.2	
5	8	50.6±4.5	44.7	56.5	
total	115	52.3	33.6	71.0	0.6775
Asian					
1	8	55.6±10.9	36.0	64.8	
2	41	54.6±9.2	34.0	75.2	
3	72	56.0±9.5	32.3	72.8	
4	30	51.9±8.3	36.0	75.7	
5	6	54.3±5.4	47.7	61.4	
total	157	54.8	32.3	75.6	0.3701
N. African					
1	4	59.6±10.8	47.5	70.9	
2	15	60.1±10.8	44.9	80.4	
3	27	56.3±8.5	37.5	68.6	
4	34	54.1±8.4	32.5	67.6	
5	14	47.8±8.2	33.6	63.4	
total	94	55.0	32.5	80.4	0.0051

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 29C. Percent of energy from carbohydrate by Guttman scale score for mothers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	58.2±14.3	34.4	80.5	
2	31	49.0±10.1	25.4	71.3	
3	36	48.8±6.8	32.8	63.7	
4	67	47.2±9.6	25.2	67.6	
5	9	46.2±11.0	34.6	69.8	
total	150	48.4	25.2	80.5	0.0598
Eu. Am.‡					
1	3	65.6±3.9	61.6	69.4	
2	35	51.8±14.2	14.5	81.7	
3	35	47.3±10.9	11.7	66.0	
4	15	48.7±8.6	33.6	66.1	
5	3	53.6±1.5	51.8	54.7	
total	91	50.1	11.7	81.7	0.0923
Asian					
1	10	60.8±15.0	45.5	87.9	
2	35	52.2±12.7	21.8	81.9	
3	45	50.7±9.9	27.7	67.4	
4	24	49.9±8.3	34.6	71.5	
5	2	49.3±1.3	48.4	50.2	
total	116	51.8	21.8	87.9	0.0992
N. African					
1	0				
2	23	52.3±10.3	34.6	75.6	
3	17	50.1±7.3	37.9	60.1	
4	41	50.9±8.7	27.1	65.0	
5	7	49.8±6.9	40.8	58.6	
total	88	51.1	27.1	75.6	0.8439

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 29D. Percent of energy from carbohydrate by Guttman scale score for girls by origin group.

group scale score	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	4	56.5±7.0	46.2	61.4	
2	29	50.6±10.1	27.6	68.7	
3	40	51.9±10.2	24.0	69.6	
4	42	50.5±10.8	27.7	75.0	
5	7	47.0±10.0	32.5	60.8	
total	122	51.0	24.0	75.0	0.6330
Eu. Am.‡					
1	7	62.3±13.3	40.0	71.8	
2	34	53.6±11.6	25.9	73.1	
3	33	49.8±9.0	35.1	76.1	
4	13	47.5±5.3	40.2	56.9	
5	4	50.1±5.0	45.3	56.8	
total	91	51.9	25.9	76.1	0.0172
Asian					
1	5	64.8±12.5	47.6	76.5	
2	26	54.8±11.4	20.7	80.1	
3	59	54.0±10.6	29.0	75.3	
4	30	49.0±8.4	30.8	66.3	
5	3	54.8±5.3	49.3	60.0	
total	123	53.4	20.7	80.1	0.0184
N. African					
1	2	58.1±3.5	55.6	60.5	
2	8	53.8±7.4	42.3	65.9	
3	42	55.6±10.1	31.0	73.5	
4	33	53.6±9.1	31.9	73.9	
5	10	45.5±8.2	31.1	60.1	
total	95	53.7	31.0	60.1	0.0494

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 30A. Percent of energy from starch by Guttman scale score for fathers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	5	19.1±12.5	5.4	36.3	
2	19	27.3±12.3	3.9	46.6	
3	68	29.2±9.7	6.9	57.1	
4	108	26.6±8.6	7.4	46.5	
5	27	21.7±8.3	3.6	42.4	
total	227	26.7	3.6	57.1	0.0036
Eu. Am.‡					
1	7	24.4±12.5	6.6	41.1	
2	73	27.3±10.3	3.0	68.3	
3	58	24.7±9.7	3.6	48.4	
4	41	27.1±8.8	11.6	45.9	
5	11	23.6±9.3	8.7	44.7	
total	190	26.2	3.0	68.3	0.4625
Asian					
1	19	27.5±10.3	5.2	42.9	
2	79	29.1±10.4	4.9	51.7	
3	89	28.3±9.6	7.4	57.3	
4	23	28.3±9.2	11.3	47.4	
5	3	22.9±5.1	17.0	26.3	
total	213	28.5	4.9	57.3	0.8203
N. African					
1	4	34.4±12.6	18.2	46.1	
2	34	31.6±9.3	11.1	50.1	
3	35	27.0±12.4	10.0	58.4	
4	60	25.8±11.1	9.0	58.6	
5	13	17.8±7.7	5.7	34.7	
total	146	27.0	5.7	58.6	0.0019

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 30B. **Percent of energy from starch by Guttman scale score for boys by origin group.**

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	32.3±11.1	18.5	50.1	
2	15	29.0±12.2	9.3	55.9	
3	52	29.6±8.5	11.4	50.0	
4	55	29.6±8.9	9.2	57.4	
5	13	24.5±8.6	12.9	40.6	
total	142	29.2	9.2	57.4	0.3616
Eu. Am.‡					
1	0				
2	38	26.5±10.2	11.4	46.9	
3	42	27.2±8.2	15.2	45.6	
4	27	28.3±7.8	12.0	41.7	
5	8	25.1±5.9	18.6	38.0	
total	115	27.1	11.4	46.9	0.7754
Asian					
1	8	31.0±12.7	12.3	44.9	
2	40	35.6±10.4	19.2	54.4	
3	72	33.4±10.0	11.6	56.4	
4	30	27.4±8.4	8.8	42.8	
5	6	27.6±4.1	20.7	31.6	
total	156	32.5	8.8	56.4	0.0074
N. African					
1	4	46.2±13.2	27.7	57.2	
2	15	33.7±9.8	14.9	48.8	
3	27	35.1±11.1	9.9	57.9	
4	34	30.3±9.7	11.4	51.8	
5	14	27.5±9.2	12.9	42.7	
total	94	32.5	9.9	57.9	0.0095

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 30C. Percent of energy from starch by Guttman scale score for mothers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	33.8±14.7	15.6	62.4	
2	31	24.3±7.2	10.5	40.2	
3	36	26.2±8.4	11.7	45.2	
4	67	23.3±8.4	0	49.7	
5	9	22.2±6.0	12.7	30.4	
total	150	24.6	0	62.4	0.0190
Eu. Am.‡					
1	3	34.5±1.9	33.0	36.6	
2	35	20.6±10.5	1.2	47.0	
3	35	19.1±6.1	3.8	28.2	
4	15	23.5±7.0	10.1	36.6	
5	3	23.4±8.1	14.7	30.7	
total	91	21.1	1.2	47.0	0.0257
Asian					
1	10	29.5±13.4	11.6	58.4	
2	35	29.0±11.9	1.9	52.0	
3	45	23.0±8.7	4.1	45.1	
4	24	24.7±9.0	10.1	51.3	
5	2	26.7±8.1	21.0	32.4	
total	116	25.8	1.9	58.4	0.0860
N. African					
1	0				
2	23	27.3±12.2	5.8	45.4	
3	17	26.6±7.8	13.3	40.3	
4	41	22.4±9.4	5.3	44.4	
5	7	17.7±3.2	12.9	22.0	
total	88	24.1	5.3	45.4	0.0529

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 30D. Percent of energy from starch by Guttman scale score for girls by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	4	26.7±7.1	21.0	36.9	
2	29	24.6±11.5	2.9	43.5	
3	40	26.4±9.1	7.1	41.8	
4	42	25.8±9.3	5.8	42.0	
5	7	22.3±5.7	13.4	28.6	
total	122	25.5	2.9	43.5	0.8188
Eu. Am.					
1	7	27.9±7.1	19.8	41.8	
2	34	24.3±11.4	4.5	51.4	
3	33	21.8±9.0	4.1	39.2	
4	13	20.4±6.8	12.0	32.9	
5	4	23.5±9.1	15.9	34.2	
total	91	23.1	4.1	51.4	0.4273
Asian					
1	5	34.3±17.3	13.4	61.4	
2	26	27.5±13.1	1.0	53.2	
3	59	28.7±9.7	6.7	49.1	
4	30	22.9±7.9	11.2	41.7	
5	3	23.9±3.0	21.7	27.3	
total	123	27.2	1.0	61.4	0.0682
N. African					
1	2	27.5±1.1	26.7	28.3	
2	8	29.4±11.6	13.0	49.3	
3	42	27.7±8.8	14.4	50.0	
4	33	26.9±10.4	8.8	47.6	
5	10	19.6±10.1	3.3	36.6	
total	95	26.7	3.3	50.0	0.1744

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 31A. Percent of energy from sugar by Guttman scale score for fathers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	5	13.5±6.2	4.1	18.1	
2	19	12.1±6.9	2.8	25.8	
3	68	10.6±6.2	0	27.0	
4	108	11.0±6.2	0	23.6	
5	27	11.8±6.3	1.0	30.8	
total	227	11.1	0	30.8	0.7000
Eu. Am.‡					
1	7	12.9±13.2	0.1	39.8	
2	73	9.6±7.0	0	32.5	
3	58	8.7±5.9	0	22.9	
4	41	10.1±5.7	0	24.9	
5	11	10.4±4.5	5.0	17.9	
total	190	9.6	0	39.8	0.5168
Asian					
1	19	8.6±5.3	0	17.6	
2	79	9.4±6.3	0	28.0	
3	89	10.1±5.7	1.0	27.9	
4	23	9.1±5.3	2.7	19.6	
5	3	8.1±2.1	6.6	10.5	
total	213	9.6	0	28.0	0.7787
N. African					
1	4	9.2±5.4	2.9	15.8	
2	34	9.0±9.0	0	40.5	
3	35	11.9±7.4	1.0	27.7	
4	60	11.7±7.1	0	27.9	
5	13	12.8±7.7	5.4	33.2	
total	146	11.1	0	40.5	0.4092

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 31B. Percent of energy from sugar by Guttman scale score for boys by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	12.9±2.8	9.3	16.3	
2	15	14.1±6.2	5.3	25.2	
3	52	12.8±5.9	2.5	27.3	
4	55	12.8±7.3	0	35.7	
5	13	11.4±6.4	3.5	27.7	
total	142	12.8	0	35.7	0.8711
Eu. Am.‡					
1	0				
2	38	15.7±10.3	0.6	47.8	
3	42	12.9±7.5	0	33.5	
4	27	12.9±7.3	2.3	31.5	
5	8	14.7±3.7	7.4	19.3	
total	115	13.9	0	47.8	0.4143
Asian					
1	8	11.8±6.3	0.7	17.4	
2	41	10.0±6.6	1.9	28.1	
3	72	13.3±7.1	1.8	41.8	
4	30	14.5±7.3	3.7	36.9	
5	6	12.0±4.3	3.8	16.7	
total	157	12.5	0.7	41.8	0.0714
N. African					
1	4	12.6±6.0	6.5	19.1	
2	15	19.0±12.1	7.1	51.6	
3	27	15.1±5.8	4.4	26.3	
4	34	13.7±8.7	0.8	35.9	
5	14	13.0±5.3	7.6	24.3	
total	94	14.8	0.8	51.6	0.2509

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 31C. Percent of energy from sugar by Guttman scale score for mothers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	10.8±8.4	2.2	28.6	
2	31	10.5±7.3	0	29.2	
3	36	9.9±7.7	0	33.2	
4	67	10.2±7.2	0	29.4	
5	9	10.7±4.1	3.5	16.3	
total	150	10.3	0	33.2	0.9955
Eu. Am.‡					
1	3	14.1±3.6	10.0	16.9	
2	35	10.65±7.8	0	36.3	
3	35	9.9±7.9	0	35.2	
4	15	9.6±7.6	0.2	22.1	
5	3	12.1±1.5	10.7	13.7	
total	91	10.4	0	36.3	0.8741
Asian					
1	10	18.0±13.6	0	51.2	
2	35	9.40±7.6	0	32.7	
3	45	12.3±7.5	2.0	35.3	
4	24	11.0±5.1	2.2	24.9	
5	2	10.9±5.8	6.8	15.0	
total	116	11.6	0	51.2	0.0468
N. African					
1	0				
2	23	9.9±7.5	0.8	23.4	
3	17	11.5±4.8	2.8	18.8	
4	41	14.0±8.4	1.5	33.2	
5	7	16.3±6.1	6.8	22.6	
total	88	12.5	0.8	33.2	0.0389

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 31D. Percent of energy from sugar by Guttman scale score for girls by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	4	15.1±7.3	4.3	19.7	
2	29	10.6±7.5	0	27.0	
3	40	12.3±7.6	0.9	33.1	
4	42	11.5±7.5	0	32.0	
5	7	9.8±4.0	5.5	15.5	
total	122	11.6	0	33.1	0.6886
Eu. Am.‡					
1	7	16.3±5.6	7.5	24.2	
2	34	12.4±8.1	1.6	34.6	
3	33	10.4±5.9	0	23.7	
4	13	12.3±7.2	0	23.1	
5	4	13.6±7.3	5.9	22.6	
total	91	12.0	0	34.6	0.3408
Asian					
1	5	6.2±3.2	3.8	11.8	
2	26	11.2±5.8	0	22.1	
3	59	12.1±6.1	1.5	29.3	
4	30	13.5±5.8	1.0	27.2	
5	3	15.1±8.4	7.0	23.8	
total	123	12.1	0	29.3	0.1014
N. African					
1	2	23.9±3.8	21.2	26.6	
2	8	17.9±8.5	9.0	30.9	
3	42	16.8±7.5	2.2	34.0	
4	33	13.9±7.9	0.5	30.6	
5	10	11.9±6.1	1.4	20.7	
total	95	15.5	0.5	34.0	0.0993

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 32A. Percent of energy from other carbohydrate by Guttman scale score for fathers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	5	19.6±15.7	4.2	46.2	
2	19	12.0±8.8	1.9	31.5	
3	68	11.6±9.1	1.4	41.5	
4	108	11.1±5.9	1.9	27.6	
5	27	11.8±5.3	4.7	25.4	
total	227	11.6	1.4	46.2	0.1826
Eu. Am.‡					
1	7	24.2±14.5	8.3	52.8	
2	73	14.8±8.4	1.2	33.6	
3	58	14.6±9.0	1.9	47.2	
4	41	12.4±7.1	1.0	30.3	
5	11	12.9±7.2	3.2	27.8	
total	190	14.4	1.0	52.8	0.0203
Asian					
1	19	17.4±13.5	1.0	47.1	
2	79	11.8±7.5	0.4	40.5	
3	89	13.1±8.0	0.3	35.7	
4	23	11.9±8.0	1.1	27.4	
5	3	11.7±3.0	8.9	14.9	
total	213	12.9	0.3	47.1	0.1256
N. African					
1	4	20.2±6.8	14.3	29.5	
2	34	14.0±8.7	1.6	33.7	
3	35	10.2±6.6	2.0	37.0	
4	60	11.5±8.0	0.9	30.4	
5	13	13.0±5.6	5.5	25.8	
total	146	12.2	0.9	37.0	0.0618

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 32B. Percent of energy from other carbohydrate by Guttman scale score for boys by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	11.3±10.2	0.6	28.7	
2	15	10.6±6.9	2.1	25.3	
3	52	10.1±6.6	0.8	28.6	
4	55	9.4±6.3	0.6	32.2	
5	13	8.8±5.4	2.4	18.3	
total	142	9.8	0.6	32.2	0.8975
Eu. Am.‡					
1	0				
2	38	11.4±8.3	1.2	36.6	
3	42	11.2±8.5	1.4	38.8	
4	27	11.2±6.3	1.4	26.2	
5	8	10.8±4.7	3.1	19.0	
total	115	11.2	1.2	38.8	0.9980
Asian					
1	8	12.7±11.0	0	27.9	
2	40	9.2±7.8	0.1	37.2	
3	72	9.3±6.0	0.3	27.8	
4	30	10.0±4.6	0.5	22.5	
5	6	19.7±2.1	11.3	17.0	
total	156	9.8	0	37.2	0.2261
N. African					
1	4	0.8±0.3	0.3	1.2	
2	15	7.3±6.2	0.8	20.2	
3	27	6.0±4.1	0	13.7	
4	34	10.1±7.0	2.5	34.7	
5	14	7.3±6.2	1.7	24.7	
total	94	7.7	0	34.7	0.0120

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 32C. Percent of energy from other carbohydrate by Guttman scale score for mothers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	13.6±6.8	2.1	21.5	
2	31	14.2±11.5	2.7	50.9	
3	36	12.6±5.6	2.5	24.4	
4	67	13.7±9.4	3.5	54.8	
5	9	13.3±8.8	5.6	30.5	
total	150	13.5	2.1	54.8	0.9685
Eu. Am.‡					
1	3	17.0±8.2	11.0	26.4	
2	35	20.5±11.7	4.2	56.3	
3	35	18.3±11.3	2.4	47.7	
4	15	15.6±9.2	5.5	33.8	
5	3	18.1±7.6	11.5	26.5	
total	91	18.6	2.4	56.3	0.6896
Asian					
1	10	13.3±13.6	0.2	45.9	
2	35	13.8±10.3	0.7	48.2	
3	45	15.4±8.4	0.5	33.3	
4	24	14.1±6.8	5.9	28.9	
5	2	11.7±1.0	11.0	12.4	
total	116	14.4	0.2	48.2	0.9014
N. African					
1	0				
2	23	15.2±8.6	2.2	32.4	
3	17	12.0±7.9	2.9	31.2	
4	41	14.6±7.2	2.9	30.1	
5	7	15.7±7.2	3.7	25.7	
total	88	14.3	2.2	32.4	0.5666

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 32D. **Percent of energy from other carbohydrate by Guttman scale score for girls by origin group.**

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	4	14.6±7.3	4.8	20.9	
2	29	15.4±7.6	5.2	34.8	
3	40	13.1±8.7	1.1	35.6	
4	42	13.2±10.1	0.9	52.5	
5	7	14.9±9.3	5.6	33.0	
total	122	13.8	0.9	52.5	0.8314
Eu. Am.‡					
1	7	18.2±10.9	5.4	31.0	
2	34	16.8±12.7	2.4	60.4	
3	33	17.6±8.9	4.3	38.6	
4	13	14.9±6.0	7.8	25.9	
5	4	12.7±5.4	6.7	17.9	
total	91	16.7	2.4	60.4	0.8449
Asian					
1	5	24.2±10.7	10.8	35.0	
2	26	16.1±12.0	0.4	43.7	
3	59	13.1±7.7	0.5	34.3	
4	30	12.5±6.1	2.3	26.3	
5	3	15.9±8.7	8.9	25.5	
total	123	14.1	0.4	43.7	0.0414
N. African					
1	2	6.7±1.4	5.7	7.7	
2	8	6.5±6.3	1.8	21.3	
3	42	11.1±7.5	1.2	31.3	
4	33	12.8±8.3	0.4	37.3	
5	10	14.0±8.6	2.2	30.6	
total	95	11.5	0.4	37.3	0.2032

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 33A. Percent of energy from alcohol by Guttman scale score for fathers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	5	0	0	0	
2	19	1.0±2.5	0	7.9	
3	68	1.3±3.6	0	24.9	
4	108	2.2±5.9	0	40.1	
5	27	2.2±2.9	0	8.9	
total	227	1.8	0		0.5807
Eu. Am.‡					
1	7	0	0	0	
2	73	1.3±4.5	0	35.1	
3	58	1.0±2.3	0	10.8	
4	41	0.6±1.6	0	7.8	
5	11	2.1±4.1	0	10.3	
total	190	1.0	0		0.5595
Asian					
1	19	6.4±10.6	0	37.7	
2	79	2.6±6.7	0	41.9	
3	39	2.5±6.1	0	40.5	
4	23	4.7±8.2	0	29.9	
5	3	1.2±2.1	0	3.7	
total	213	3.1	0		0.1586
N. African					
1	4	7.5±8.0	0	18.9	
2	34	3.5±6.6	0	26.4	
3	35	3.5±5.4	0	25.9	
4	60	5.1±8.3	0	44.3	
5	13	8.7±7.6	0	25.1	
total	146	4.8	0		0.1624

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 33B. Percent of energy from alcohol by Guttman scale score for boys by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	0	0	0	
2	15	0	0	0	
3	52	0±0.1	0	0.4	
4	55	0.2±1.0	0	5.2	
5	13	0.4±1.1	0	3.9	
total	142	0.1	0	5.2	0.2409
Eu. Am.‡					
1	0				
2	38	0.6±2.7	0	16.0	
3	42	0.3±1.0	0	3.8	
4	27	0.4±1.0	0	3.9	
5	8	1.3±3.6	0	10.1	
total	115	0.5	0	16.0	0.6102
Asian					
1	8	1.6±2.9	0	7.2	
2	41	0.5±1.8	0	9.6	
3	72	0.3±1.2	0	9.1	
4	30	0.5±0.9	0	3.7	
5	6	0.6±1.4	0	3.4	
total	157	0.5	0	9.6	0.2532
N. African					
1	4	0	0		
2	15	0	0		
3	27	0.1±0.7	0	3.9	
4	34	1.6±4.6	0	25.7	
5	14	0.5±1.7	0	6.4	
total	94	0.7	0	3.9	0.2767

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 33C. Percent of energy from alcohol by Guttman scale score for mothers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	0	0	0	
2	31	0.9±2.8	0	11.7	
3	36	0.3±1.4	0	8.7	
4	67	0.2±1.0	0	6.7	
5	9	0.6±1.0	0	2.6	
total	150	0.4	0	11.7	0.2888
Eu. Am.‡					
1	3	0	0	0	
2	35	1.9±7.2	0	39.8	
3	35	1.0±4.7	0	27.8	
4	15	0.1±0.3	0	0.9	
5	3	0	0	0	
total	91	1.1	0	39.8	0.8242
Asian					
1	10	3.2±10.1	0	32.0	
2	35	0	0	0	
3	45	0.1±0.6	0	4.4	
4	24	0.5±1.0	0	3.2	
5	2	0	0	0	
total	116	0.4	0	32.0	0.0433
N. African					
1	0				
2	23	2.0±5.3	0	24.5	
3	17	0.2±0.8	0	3.2	
4	41	0.1±0.6	0	3.6	
5	7	1.1±2.0	0	5.3	
total	88	0.7	0	24.5	0.0629

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 33D. Percent of energy from alcohol by Guttman scale score for girls by origin group.

group	individuals	mean*	min. value	max. value	sig
	n	%	%	%	
Israeli					
1	4	0	0	0	
2	29	0	0	0	
3	40	0.1±0.5	0	2.8	
4	42	0	0	0	
5	7	0	0	0	
total	122	<0.1	0	2.8	0.5074
Eu. Am.					
1	7	0	0	0	
2	34	0.2±0.8	0	4.8	
3	33	0	0	0	
4	13	0.2±0.8	0	2.7	
5	4	0	0	0	
total	91	0.1	0	4.8	0.6297
Asian					
1	5	0	0	0	
2	26	0	0	0	
3	59	< 0.1±0.2	0	1.2	
4	30	0	0	0	
5	3	0	0	0	
total	123	< 0.01	0	1.2	0.9001
N. African					
1	2	0	0	0	
2	8	0	0	0	
3	42	<0.1±0.3	0	1.9	
4	33	0	0	0	
5	10	0.1±0.3	0	1.1	
total	95	<0.1	0	1.9	0.07079

*Mean±standard deviation.

One way analysis of variance (ANOVA) signifcance.

Europe-American.

Table 34A. Fathers' dietary complexity[*] by workday status and origin

group	workday		dayoff		total		sig[†]
	n	%	n	%	n	%	
Israeli							
low	75	82.4	16	17.6	91	40.4	
high	82	61.2	52	38.8	134	59.6	
total	157	69.8	68	30.2	225	100.0	0.0011
Eu. Am[‡]							
low	70	89.7	8	10.3	78	41.5	
high	85	77.3	25	22.7	110	58.5	
total	155	82.4	33	17.6	188	100.0	0.0434
Asian							
low	65	69.9	28	30.1	93	45.1	
high	66	58.4	47	41.6	113	54.9	
total	131	63.6	75	36.4	206	100.0	0.1189
N. African							
low	50	74.6	17	25.4	67	47.9	
high	39	53.4	34	46.6	73	52.1	
total	89	63.6	51	36.4	140	100.0	0.0152
all							
low	260	79.0	69	21.0	329	43.3	
high	272	63.3	158	36.7	430	56.7	
total	532	70.1	227	29.9	759	100.0	<0.0001[**]

[*] Complexity defined as low/high: below/above mean scale score for each origin group.

[†] X^2 significance.

[‡] Europe-American.

[#] $X^2_1 = 10.5914$, [¶] $X^2_1 = 4.0806$, [//] $X^2_1 = 5.8969$, [**] $X^2_1 = 21.3706$

Table 34B. Boys' dietary complexity* by workday status and origin

group	workday n	workday %	dayoff n	dayoff %	total n	total %	sig†
Israeli							
low	48	65.8	25	34.2	73	51.8	
high	42	61.8	26	38.2	68	48.2	
total	90	63.8	51	36.2	141	100.0	0.7511
Eu. Am‡							
low	23	62.2	14	37.8	37	32.7	
high	42	55.3	34	44.7	76	67.3	
total	65	57.5	38	42.5	113	100.0	0.6217
Asian							
low	31	67.4	15	32.6	46	29.9	
high	68	63.0	40	37.0	108	70.1	
total	99	64.3	55	35.7	154	100.0	0.7330
N. African							
low	28	62.2	17	37.8	45	49.5	
high	25	54.3	21	45.7	46	50.5	
total	53	58.2	38	41.8	91	100.0	0.5830
all							
low	130	64.7	71	35.3	201	40.3	
high	177	59.4	121	40.6	298	59.7	
total	307	61.5	192	38.5	499	100.0	0.2734

*Complexity defined as low/high: below/above mean scale score for each origin group.

†X^2 significance.

‡Europe-American.

Table 34C. Mothers' dietary complexity* by workday status and origin

group	workday n	workday %	dayoff n	dayoff %	total n	total %	sig†
Israeli							
low	57	77.0	17	23.0	74	49.3	
high	51	67.1	25	32.9	76	50.7	
total	108	72.0	42	28.0	150	100.0	0.2415
Eu. Am‡							
low	26	68.4	12	31.6	38	41.8	
high	36	67.9	17	32.1	53	58.2	
total	62	68.1	29	31.9	91	100.0	1.0000
Asian							
low	36	80.0	9	20.0	45	38.8	
high	46	64.8	25	35.2	71	61.2	
total	82	70.7	34	29.3	116	100.0	0.1225
N. African							
low	36	92.3	3	7.7	39	44.8	
high	22	45.8	26	54.2	48	55.2	
total	58	66.7	29	33.3	87	100.0	<0.0001#
all							
low	155	79.1	41	20.9	196	44.1	
high	155	62.5	93	37.5	248	55.9	
total	310	69.8	134	30.2	444	100.0	0.0002¶

*Complexity defined as low/high: below/above mean scale score for each origin group.

†X^2 significance.

‡Europe-American.

#X^2_1 = 18.8744, ¶X^2_1 = 13.5089

Table 34D. Girls' dietary complexity* by workday status and origin

group	workday n	workday %	dayoff n	dayoff %	total n	total %	sig†
Israeli							
low	51	69.9	22	30.1	73	59.8	
high	23	46.9	26	53.1	49	40.2	
total	74	60.7	48	39.3	122	100.0	0.0137#
Eu. Am‡							
low	28	68.3	13	31.7	41	45.1	
high	25	50.0	25	50.0	50	54.9	
total	53	58.2	38	41.8	91	100.0	0.1219
Asian							
low	23	74.2	8	25.8	31	25.4	
high	53	58.2	38	41.8	91	74.6	
total	76	62.3	46	37.7	122	100.0	0.1713
N. African							
low	34	66.7	17	33.3	51	54.3	
high	25	58.1	18	41.9	43	45.7	
total	59	62.8	35	37.2	94	100.0	0.5236
all							
low	136	69.4	60	30.6	196	45.7	
high	126	54.1	107	45.9	233	54.3	
total	262	61.1	167	38.9	429	100.0	0.0017¶

*Complexity defined as low/high: below/above mean scale score for each origin group.

† X^2 significance.

‡ Europe-American.

\# X^2_1 = 5.532, X_{21} = 9.862.

Table 35A. Fathers' Guttman scale score by workday status

group	workday n	workday %	dayoff n	dayoff %	total n	total %	sig*
Israeli							
1	5	100.0	0	0	5	2.2	
2	13	68.4	6	31.6	19	8.4	
3	57	85.1	10	14.9	67	29.8	
4	75	70.1	32	29.9	107	47.6	
5	7	25.9	20	74.1	27	12.0	
total	157	69.8	68	30.2	225	100.0	<0.0001‡
Eu. Am.†							
1	6	100.0	0	0	6	3.2	
2	64	88.9	8	11.1	72	38.3	
3	48	82.8	10	17.2	58	30.9	
4	29	70.7	12	29.3	41	21.8	
5	8	72.7	3	27.3	11	5.9	
total	155	82.4	33	17.6	188	100.0	0.0933
Asian							
1	11	64.7	6	35.3	17	8.3	
2	54	71.1	22	28.9	76	36.9	
3	58	65.9	30	34.1	88	42.7	
4	6	27.3	16	72.7	22	10.7	
5	2	66.7	1	33.3	3	1.5	
total	131	63.6	75	36.4	206	100.0	0.0056#
N. African							
1	3	75.0	1	25.0	4	2.9	
2	23	79.3	6	20.7	29	20.7	
3	24	70.6	10	29.4	34	24.3	
4	36	60.0	24	40.0	60	42.9	
5	3	23.1	10	76.9	13	9.3	
total	89	63.6	51	36.4	140	100.0	0.0087¶
all							
1	25	78.1	7	21.9	32	4.2	
2	154	78.6	42	21.4	196	25.8	
3	187	75.7	60	24.3	247	32.5	
4	146	63.5	84	36.5	230	30.3	
5	20	37.0	34	63.0	54	7.1	
total	532	70.1	227	29.9	759	100.0	<0.0001//

*X^2 significance.

†Europe-American.

‡$X^2_4 = 34.2419$, #$X^2_4 = 14.5868$, ¶$X^2_4 = 13.5861$, //$X^2_4 = 44.3694$

Table 35B. Boys' Guttman scale score by workday status

group	workday		dayoff		total		sig[*]
	n	%	n	%	n	%	
Israeli							
1	3	42.9	4	57.1	7	5.0	
2	11	78.6	3	21.4	14	9.9	
3	34	65.4	18	34.6	52	36.9	
4	34	61.8	21	38.2	55	39.0	
5	8	61.5	5	38.5	13	9.2	
total	90	63.8	51	36.2	141	100.0	0.5864
Eu. Am.[†]							
1	0						
2	23	62.2	14	37.8	37	32.7	
3	28	68.3	13	31.7	41	36.3	
4	12	44.4	15	55.6	27	23.9	
5	2	25.0	6	75.0	8	7.1	
total	65	57.5	48	42.5	113	100.0	0.0544[‡]
Asian							
1	3	42.9	4	57.1	7	4.5	
2	28	71.8	11	28.2	39	25.3	
3	54	75.0	18	25.0	72	46.8	
4	12	40.0	18	60.0	30	19.5	
5	2	33.3	4	66.7	6	3.9	
total	99	64.3	55	35.7	154	100.0	0.0028[#]
N. African							
1	1	25.0	3	75.0	4	4.4	
2	11	78.6	3	21.4	14	15.4	
3	16	59.3	11	40.7	27	29.7	
4	21	63.6	12	36.4	33	36.3	
5	4	30.8	9	69.2	13	14.3	
total	53	58.2	38	41.8	91	100.0	0.0708
all							
1	7	38.9	11	61.1	18	3.6	
2	74	70.5	31	29.5	105	21.0	
3	132	68.8	60	31.3	192	38.4	
4	79	54.5	66	45.5	145	29.0	
5	16	40.0	24	60.0	40	8.0	
total	308	61.6	192	38.4	500	100.0	0.0002[¶]

[*] X^2 significance.

[†] Europe-American.

[‡] $X^2 = 7.6254$, [#] $X^2_4 = 16.166$, [¶] $X^2_4 = 22.566$.

Table 35C. Mothers' Guttman scale score by workday status

group	workday n	workday %	dayoff n	dayoff %	total n	total %	sig*
Israeli							
1	7	100.0	0	0	7	4.7	
2	24	77.4	7	22.6	31	20.7	
3	26	72.2	10	27.8	36	24.0	
4	49	73.1	18	26.9	67	44.7	
5	2	22.2	7	77.8	9	6.0	
total	108	72.0	42	28.0	150	100.0	0.0065 †
Eu. Am.‡							
1	3	100.0	0	0	3	3.3	
2	23	65.7	12	34.3	35	38.5	
3	23	65.7	12	34.3	35	38.5	
4	11	73.3	4	26.7	15	16.5	
5	2	66.7	1	33.3	3	3.3	
total	62	68.1	29	31.9	91	100.0	0.7759
Asian							
1	8	80.0	2	20.0	10	8.6	
2	28	80.0	7	20.0	35	30.2	
3	32	71.1	13	28.9	45	38.8	
4	13	54.2	11	45.8	24	20.7	
5	1	50.0	1	50.0	2	1.7	
total	82	70.7	34	29.3	116	100.0	0.2431
N. African							
1	0						
2	21	95.5	1	4.5	22	25.3	
3	15	88.2	2	11.8	17	19.5	
4	22	53.7	19	46.3	41	47.1	
5	0		7	100.0	7	8.0	
total	58	66.7	29	33.3	87	100.0	<0.0001 #
all							
1	18	90.0	2	10.0	20	4.5	
2	96	78.0	27	22.0	123	27.7	
3	96	72.2	37	27.8	133	30.0	
4	95	64.6	52	35.4	147	33.1	
5	5	23.8	16	76.2	21	4.7	
total	310	69.8	134	30.2	444	100.0	<0.0001 ¶

* X^2 significance.

‡ Europe-American.

† $X^2_4 = 14.2792$, # $X^2_4 = 28.8353$, ¶ $X^2_4 = 31.1491$

Table 35D. Girls' Guttman scale score by workday status

group	workday n	workday %	dayoff n	dayoff %	total n	total %	sig*
Israeli							
1	1	25.0	3	75.0	4	3.3	
2	23	79.3	6	20.7	29	23.8	
3	27	67.5	13	32.5	40	32.8	
4	21	50.0	21	50.0	42	34.4	
5	2	28.6	5	71.4	7	5.7	
total	74	60.7	48	39.3	122	100.0	0.0162†
Eu. Am.‡							
1	4	57.1	3	42.9	7	7.7	
2	24	70.6	10	29.4	34	37.4	
3	17	51.5	16	48.5	33	36.3	
4	7	53.8	6	46.2	13	14.3	
5	1	25.0	3	75.0	4	4.4	
total	53	58.2	38	41.8	91	100.0	0.3230
Asian							
1	5	100.0	0	0	5	4.1	
2	18	69.2	8	30.8	26	21.3	
3	39	67.2	19	32.8	58	47.5	
4	13	43.3	17	56.7	30	24.6	
5	1	3.3	2	66.7	3	2.5	
total	76	62.3	46	37.7	122	100.0	0.0435#
N. African							
1	2	100.0	0	0	2	2.1	
2	6	75.0	2	25.0	8	8.5	
3	26	63.4	15	36.6	41	43.6	
4	19	57.6	14	42.4	33	35.1	
5	6	60.0	4	40.0	10	10.6	
total	59	62.8	35	37.2	94	100.0	0.7138
all							
1	12	66.7	6	33.3	18	4.2	
2	71	73.2	26	26.8	97	22.6	
3	109	63.4	63	36.6	172	40.1	
4	60	50.8	58	49.2	118	27.5	
5	10	41.7	14	58.3	24	5.6	
total	262	61.1	167	38.9	429	100.0	0.0036¶

*X^2 significance.

‡Europe-American.

†$X^2_4 = 12.163$, #$X^2_4 = 9.826$, ¶$X^2_4 = 15.607$

APPENDIX 7

Tables for Health and Behavior Analyses

Table 36. Quetelet index* index by high and low dietary complexity,† generation and gender, all origin groups combined

group	n	mean‡	sig≠
fathers			
low	343	26.4±3.5	
high	433	26.3±3.4	0.729
boys			
low	205	21.1±3.2	
high	300	21.0±3.2	0.698
mothers			
low	197	27.0±4.4	
high	248	26.7±4.6	0.483
girls			
low	197	21.7±2.5	
high	234	21.4±2.6	0.201

*Quetelet index: wt (kg)/Ht $(m)^2$

†Complexity defined as low/high: below/above mean scale score for each origin group.

‡Mean±standard deviation.

≠Significance of students' t Test.

Table 37A. Quetelet index* by Guttman scale score for fathers by origin group

group	individuals	mean†	min. value	max. value	sig‡
	n	%	%	%	
Israeli					
1	5	25.40±4.08	20.52	30.12	
2	19	25.97±4.32	18.67	36.93	
3	68	26.56±3.59	19.27	35.59	
4	108	25.98±3.27	15.28	36.76	
5	27	27.56±3.32	22.46	36.88	
total	227	26.41	15.28	36.93	0.2319
Eu. Am.#					
1	7	25.01±2.30	22.91	28.28	
2	73	26.06±2.76	19.92	33.80	
3	58	26.36±3.67	20.75	35.44	
4	41	25.26±2.95	18.67	32.95	
5	11	26.03±3.52	18.72	31.85	
total	190	25.94	18.67	35.44	0.4529
Asian					
1	19	28.46±4.93	19.86	41.45	
2	79	26.12±3.39	18.38	34.14	
3	89	26.45±3.58	18.11	36.65	
4	23	27.15±3.76	22.53	35.67	
5	3	26.27±2.02	24.07	28.04	
total	213	26.58	18.11	41.45	0.1425
N. African					
1	4	25.95±2.31	24.34	29.35	
2	34	25.96±3.23	20.00	33.58	
3	35	26.89±3.48	20.83	35.88	
4	60	26.53±3.08	21.29	38.30	
5	13	26.30±2.48	23.07	32.86	
total	146	26.45	19.96	38.30	0.7927

*Quetelet index: wt (kg)/Ht (m)^2.

†Mean±standard deviation.

‡One way analysis of variance (ANOVA) signifcance.

#Europe-American.

Table 37B. **Quetelet index by Guttman scale score for boys by origin group**

group	individuals	mean*	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	18.50±1.41	16.71	20.43	
2	15	21.20±3.45	16.15	30.95	
3	52	21.31±2.79	16.23	30.62	
4	55	21.36±2.89	15.03	32.30	
5	13	21.31±3.24	18.78	30.69	
total	142	21.18	15.03	32.30	0.1823
Eu. Am.‡					
1	0				
2	38	21.28±3.28	17.27	33.96	
3	42	21.56±3.25	16.80	30.80	
4	27	20.00±2.71	16.76	29.07	
5	8	20.01±3.14	15.54	24.98	
total	115	21.22	15.54	33.96	0.6021
Asian					
1	8	22.71±6.61	18.04	37.82	
2	40	21.00±2.51	14.62	26.85	
3	72	20.56±4.27	15.79	51.92	
4	29	21.10±2.35	16.54	25.96	
5	6	21.39±3.09	18.34	25.44	
total	155	20.91	14.62	51.92	0.6020
N. African					
1	3	20.16±1.23	19.19	21.54	
2	15	18.76±2.44	11.68	21.83	
3	27	21.91±3.11	17.86	30.06	
4	34	20.19±2.29	16.14	27.56	
5	14	21.21±1.64	13.05	24.00	
total	93	20.61	11.68	30.06	0.0029

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 37C. Quetelet index by Guttman scale score for mothers by origin group.

group	individuals	mean	min. value	max. value	sig†
	n	%	%	%	
Israeli					
1	7	26.62±3.36	22.57	31.25	
2	31	27.16±5.21	19.43	41.50	
3	36	26.58±3.81	16.60	33.99	
4	67	26.39±4.73	18.59	40.12	
5	9	24.52±3.00	19.52	28.59	
total	150	26.49	16.60	41.50	0.6511
Eu. Am.‡					
1	3	25.65±0.72	25.00	26.43	
2	35	25.92±3.52	20.00	35.01	
3	35	25.40±4.49	18.78	39.21	
4	15	26.90±4.40	21.64	35.68	
5	3	25.97±5.10	22.41	31.81	
total	91	25.87	18.78	39.21	0.8380
Asian					
1	10	27.65±5.62	20.81	39.19	
2	35	27.43±4.56	19.24	40.11	
3	45	25.88±4.01	17.92	35.52	
4	24	27.43±3.50	18.84	35.50	
5	2	32.89±0.93	32.23	33.55	
total	116	26.94	17.92	40.11	0.1044
N. African					
1	0				
2	23	28.58±5.28	22.07	40.86	
3	17	27.40±4.37	20.87	36.11	
4	41	28.82±5.16	20.80	43.42	
5	7	29.14±3.92	22.02	33.33	
total	88	28.51	20.80	43.42	0.7701

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 37D. **Quetelet index by Guttman scale score for girls by origin group**

group	individuals	mean	min. value	max. value	sig[†]
	n	%	%	%	
Israeli					
1	4	21.77±1.30	21.03	23.71	
2	29	22.00±2.50	16.63	26.50	
3	40	21.49±2.77	16.04	26.98	
4	42	20.82±2.38	16.80	30.28	
5	7	21.24±1.91	18.00	23.24	
total	122	21.37	16.04	30.28	0.3968
Eu. Am.[‡]					
1	7	21.84±2.98	18.03	27.41	
2	34	21.62±2.10	17.97	26.59	
3	33	21.46±2.84	17.17	28.51	
4	13	21.72±2.40	18.00	26.19	
5	4	19.74±0.96	18.55	20.83	
total	91	21.51	17.17	28.51	0.6733
Asian					
1	5	21.62±2.95	19.10	26.62	
2	26	21.92±2.60	17.30	26.91	
3	59	21.67±2.77	17.36	28.76	
4	30	21.66±2.87	14.95	28.22	
5	3	24.89±4.06	22.38	29.58	
total	123	21.80	14.95	29.58	0.4154
N. African					
1	2	21.37±1.58	20.25	22.49	
2	8	22.93±4.12	19.73	31.63	
3	42	21.58±2.47	16.94	27.44	
4	33	21.25±2.24	17.66	26.04	
5	10	21.66±1.49	19.81	24.00	
total	95	21.58	16.94	31.63	0.5651

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 38A. **Diastolic blood pressure by high and low dietary complexity,* generation and gender, all origin groups combined**

group	individuals	mean†	sig‡
	n	mmHg	
fathers			
low	343	79±10.3	
high	433	80±10.9	0.277
boys			
low	205	71±7.7	
high	300	72±20.6	0.293
mothers			
low	197	76±9.3	
high	248	76±10.2	0.690
girls			
low	197	72±7.9	
high	234	71±8.7	0.392

*Complexity defined as low/high: below/above mean scale score for each origin group.

†Mean±standard deviation.

‡Significance of students's t Test.

Table 38B. Systolic blood pressure by high and low dietary complexity,* generation and gender, all origin groups combined

group	individuals	mean†	sig‡
	n	mmHg	
fathers			
343	343	120.0±17.6	
high	433	120.0±17.0	0.908
boys			
low	205	110.9±10.7	
high	300	112.2±10.4	0.185
mothers			
low	197	116.0±16.0	
high	248	116.0±16.8	0.869
girls			
low	197	10[illegible].5±8.5	
high	234	107.5±9.9	0.297

*Complexity defined as low/high: below/above mean scale score for each origin group.

†Mean±standard deviation.

‡Significance of students's t Test.

Table 39A. Distolic blood pressure by Guttman scale score for fathers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mmHg	mmHg	mmHg	
Israeli					
1	5	74±8.4	60	81	
2	19	76±8.6	60	90	
3	68	78±9.2	56	100	
4	108	79±10.9	60	115	
5	27	81±8.2	53	93	
total	227	78	53	115	0.3592
Eu. Am.‡					
1	7	82±14.2	72	111	
2	73	80±11.8	60	130	
3	58	82±12.8	59	121	
4	41	79±11.6	60	118	
5	11	77±10.6	52	89	
total	190	80	52	130	0.6842
Asian					
1	19	81±12.5	61	119	
2	79	81±9.6	60	110	
3	89	81±9.1	60	102	
4	23	78±14.0	60	103	
5	3	76±8.7	70	86	
total	213	81	60	119	0.6167
N. African					
1	4	76±12.5	60	90	
2	34	78±10.1	60	100	
3	35	78±9.4	64	110	
4	60	80±10.6	60	110	
5	13	83±11.7	63	110	
total	146	79	60	110	0.6327

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 39B. Distolic blood pressure by Guttman scale score for boys by origin group.

group	individuals	mean*	min. value	max. value	sig+
	n	mmHg	mmHg	mmHg	
Israeli					
1	7	68±6.8	59	80	
2	15	72±7.3	59	84	
3	52	72±7.1	58	89	
4	55	73±6.9	57	91	
5	13	72±7.8	60	84	
total	142	72	57	91	0.3598
Eu. Am.‡					
1	0				
2	38	72±8.1	59	88	
3	42	72±7.7	57	98	
4	27	72±8.0	60	90	
5	8	77±9.3	59	88	
total	115	75	57	98	0.4541
Asian					
1	8	73±9.5	59	90	
2	40	72±7.3	58	88	
3	72	70±8.4	54	90	
4	29	71±7.2	60	84	
5	6	76±9.2	66	90	
total	155	71	54	90	0.4144
N. African					
1	3	75±8.1	66	80	
2	15	68±7.4	58	86	
3	27	70±8.8	53	83	
4	34	70±7.2	50	85	
5	14	70±5.4	59	79	
total	93	70	50	86	0.6509

*Mean±standard deviation.

+One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 39C. Distolic blood pressure by Guttman scale score for mothers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mmHg	mmHg	mmHg	
Israeli					
1	7	75±8.3	65	87	
2	31	76±7.7	64	92	
3	36	77±11.9	60	110	
4	67	74±9.1	60	105	
5	9	78±10.1	59	91	
total	150	76	59	110	0.6219
Eu. Am.‡					
1	3	76±6.1	69	81	
2	35	77±9.3	60	100	
3	35	79±11.9	60	109	
4	15	79±14.3	60	110	
5	3	75±5.3	71	81	
total	91	78	60	110	0.8537
Asian					
1	10	70±8.9	56	90	
2	35	77±9.9	60	102	
3	45	76±9.1	60	98	
4	24	75±9.0	50	91	
5	2	71±10.6	64	79	
total	116	75	50	102	0.3371
N. African					
1	0				
2	23	74.0±8.8	60	95	
3	17	74.0±12.4	50	103	
4	41	77.0±10.2	54	99	
5	7	72.0±13.2	58	97	
total	88	75.0	50	103	0.4746

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 39D. Distolic blood pressure by Guttman scale score for girls by origin group.

group scale score	individuals	mean*	min. value	max. value	sig†
	n	mmHg	mmHg	mmHg	
Israeli					
1	4	69±14.4	48	80	
2	29	71±8.0	58	90	
3	40	73±5.9	62	87	
4	42	71±8.7	56	95	
5	7	69±5.9	60	77	
total	122	71.0	48	95	0.5454
Eu. Am.‡					
1	7	76±5.1	70	82	
2	34	73±7.9	55	91	
3	33	72±8.8	52	89	
4	13	71±6.7	57	82	
5	4	67±7.7	60	78	
total	91	72.0	52	91	0.4665
Asian					
1	5	72±10.8	57	85	
2	26	68±8.9	46	83	
3	59	71±8.2	54	91	
4	30	73±11.3	60	116	
5	3	74±14.4	66	91	
total	123	71	46	116	0.3248
N. African					
1	2	85±3.5	83	88	
2	8	73±7.2	62	87	
3	42	71±7.4	57	86	
4	33	68±8.6	52	83	
5	10	70±5.5	59	81	
total	95	70	52	88	0.0309

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 40A. Systolic blood pressure by Guttman scale score for fathers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mmHg	mmHg	mmHg	
Israeli					
1	5	109±10.8	95	125	
2	19	118±17.6	90	161	
3	68	118±15.5	86	170	
4	108	118±15.2	87	174	
5	27	122±12.3	93	145	
total	227	118	86	174	0.4385
Eu. Am.‡					
1	7	117±14.7	98	138	
2	73	122±20.6	82	202	
3	58	122±18.6	90	180	
4	41	120±17.1	91	169	
5	11	119±10.8	102	139	
total	190	121	82	202	0.8839
Asian					
1	19	123±18.5	100	179	
2	79	120±16.1	83	159	
3	89	120±15.1	90	167	
4	23	117±21.3	90	162	
5	3	118±18.1	105	139	
total	213	120	83	179	0.8180
N. African					
1	4	120±7.6	110	128	
2	34	120±18.8	80	178	
3	35	119±19.2	99	202	
4	60	121±21.2	90	185	
5	13	122±19.7	92	170	
total	146	120	80	202	0.9910

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 40B. Systolic blood pressure by Guttman scale score for boys by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mmHg	mmHg	mmHg	
Israeli					
1	7	108±10.5	92	121	
2	15	110±6.2	99	119	
3	52	112±11.6	90	145	
4	55	113±9.7	91	146	
5	13	110±10.0	91	123	
total	142	112	90	146	0.6284
Eu. Am.‡					
1	0				
2	38	114±10.2	90	134	
3	42	115±11.6	93	156	
4	27	115±12.2	87	150	
5	8	115±15.6	100	147	
total	115	114	87	156	0.9473
Asian					
1	8	113±12.7	91	132	
2	40	111±9.3	94	137	
3	72	111±8.4	94	138	
4	29	112±9.5	94	129	
5	6	117±8.4	104	128	
total	155	111	91	138	0.5379
N. African					
1	3	110±10.0	100	120	
2	15	104±5.3	95	112	
3	27	111±14.1	80	141	
4	34	109±9.9	91	130	
5	14	110±13.4	95	146	
total	93	109	80	146	0.4329

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 40C. Systolic blood pressure by Guttman scale score for mothers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mmHg	mmHg	mmHg	
Israeli					
1	7	114±12.1	93	130	
2	31	116±12.2	88	139	
3	36	118±17.5	86	170	
4	67	113±13.8	81	147	
5	9	118±11.7	104	140	
total	150	115	81	170	0.6093
Eu. Am.‡					
1	3	109±9.2	99	117	
2	35	118±12.9	93	147	
3	35	118±18.7	85	166	
4	15	121±27.8	90	207	
5	3	135±10.1	123	141	
total	91	119	85	207	0.4728
Asian					
1	10	114±14.1	99	139	
2	35	113±18.5	89	159	
3	45	115±15.7	87	160	
4	24	116±12.8	90	148	
5	2	125±17.0	113	137	
total	116	116	87	160	0.8206
N. African					
1	0				
2	23	118±20.1	90	167	
3	17	111±17.8	84	146	
4	41	118±16.9	83	159	
5	7	111±26.1	89	159	
total	88	116	83	167	0.5027

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 40D. Systolic blood pressure by Guttman scale score for girls by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mmHg	mmHg	mmHg	
Israeli					
1	4	108±3.6	100	120	
2	29	108±7.9	93	122	
3	40	111±6.4	100	118	
4	42	107±10.6	85	130	
5	7	102±8.2	89	112	
total	122	108	85	130	0.0675
Eu. Am.‡					
1	7	111±8.3	102	120	
2	34	109±10.9	90	132	
3	33	111±11.5	93	143	
4	13	108±12.3	89	131	
5	4	107±4.4	102	111	
total	91	109	89	143	0.8658
Asian					
1	5	108±7.4	99	118	
2	26	105±7.7	92	121	
3	59	109±10.1	90	133	
4	30	109±6.9	92	122	
5	3	105±13.6	96	121	
total	123	108	90	133	0.4667
N. African					
1	2	112±4.9	109	116	
2	8	110±9.8	94	124	
3	42	107±8.7	93	130	
4	33	103±7.7	91	117	
5	10	105±8.7	91	115	
total	95	105	91	130	0.0688

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 41. Plasma total cholesterol by high and low dietary complexity,* generation and gender, all origin groups combined

group	individuals	mean†	sig‡
	n	mg/dl	
fathers			
low	342	197±37.2	
high	433	206±39.4	0.002
boys			
low	204	133±24.5	
high	300	132±23.5	0.942
mothers			
low	196	194±33.9	
hign	247	197±37.0	0.347
girls			
low	197	150±23.7	
high	231	149±28.7	0.778

*Complexity defined as low/high: below/above mean scale score for each origin group.

†Mean±standard deviation.

‡Significance of students's t Test.

Table 42A. Plasma total cholesterol by Guttman scale score for fathers by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mg/dl	mg/dl	mg/dl	
Israeli					
1	5	177±40.0	154	248	
2	19	211±42.5	156	345	
3	68	209±33.4	149	290	
4	108	217±38.0	147	308	
5	27	210±40.3	148	330	
total	227	212	147	345	0.1335
Eu. Am.‡					
1	7	205±42.3	161	269	
2	73	204±34.9	126	275	
3	58	201±33.4	127	296	
4	41	202±35.2	122	287	
5	11	206±29.0	159	256	
total	190	203	122	296	0.9919
Asian					
1	19	198±39.6	129	281	
2	78	186±39.6	80	313	
3	89	204±45.9	92	399	
4	23	198±35.5	147	275	
5	3	223±37.5	186	261	
total	212	197	80	399	0.0614
N. African					
1	4	187±15.8	171	203	
2	34	193±40.0	136	306	
3	35	186±26.5	128	238	
4	60	200±40.9	129	342	
5	13	182±29.8	129	239	
total	146	193	128	342	0.3048

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 42B. **Plasma total cholesterol by Guttman scale score for boys by origin group.**

group	individuals	mean*	min. value	max. value	sig†
	n	mg/dl	mg/dl	mg/dl	
Israeli					
1	7	118±27.6	85	148	
2	15	131±19.3	98	168	
3	52	141±26.0	91	221	
4	55	137±26.3	97	207	
5	13	130±21.5	96	163	
total	142	136	85	221	0.1280
Eu. Am.‡					
1	0				
2	38	134±26.0	85	187	
3	42	141±22.5	99	186	
4	27	132±19.6	91	177	
5	8	146±19.7	123	178	
total	115	137	85	187	0.2313
Asian					
1	8	135±19.3	116	165	
2	40	130±21.0	87	184	
3	72	127±24.4	75	190	
4	29	129±20.6	97	189	
5	6	137±28.1	86	170	
total	155	129	75	190	0.7551
N. African					
1	3	122±21.7	99	142	
2	14	118±19.2	88	149	
3	27	131±26.0	79	202	
4	34	123±21.4	117	184	
5	14	140±14.9	79	164	
total	92	127		202	0.0566

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 42C. Plasma total cholesterol by Guttman scale score for mother by origin group.

group	individuals	mean*	min. value	max. value	sig†
	n	mg/dl	mg/dl	mg/dl	
Israeli					
1	7	196±37.1	128	247	
2	31	192±32.5	140	256	
3	36	206±38.6	115	290	
4	66	193±31.7	124	264	
5	9	222±50.4	130	347	
total	149	198	115	347	0.0814
Eu. Am.‡					
1	3	209±51.3	150	245	
2	35	199±35.4	126	277	
3	35	206±32.3	134	279	
4	15	206±35.9	147	262	
5	3	211±37.5	174	249	
total	91	203	126	279	0.8875
Asian					
1	10	181±32.7	135	224	
2	34	186±29.4	139	261	
3	45	193±41.0	124	309	
4	24	194±31.9	139	258	
5	2	198±57.3	158	239	
total	115	190	124	309	0.7705
N. African					
1	0				
2	23	193±32.6	135	275	
3	17	178±22.4	144	214	
4	41	189±39.8	114	291	
5	7	209±49.5	157	294	
total	88	190	114	294	0.2822

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 42D. **Plasma total cholesterol by Guttman scale score for girl by origin group.**

group	individuals	mean*	min. value	max. value	sig†
	n	mg/dl	mg/dl	mg/dl	
Israeli					
1	4	155±14.0	141	173	
2	29	155±25.1	117	204	
3	40	149±22.3	106	204	
4	41	158±36.5	113	346	
5	7	154±21.3	131	184	
total	121	154	106	346	0.7540
Eu. Am.‡					
1	7	156±18.3	130	181	
2	34	158±25.7	112	220	
3	33	148±23.3	112	217	
4	12	158±35.3	121	220	
5	4	131±20.6	111	160	
total	90	153	111	220	0.2288
Asian					
1	5	149±12.5	134	159	
2	26	153±22.8	105	199	
3	58	149±29.0	100	214	
4	30	148±26.2	103	233	
5	3	144±23.2	125	170	
total	122	149	100	233	0.9290
N. African					
1	2	136±37.5	110	163	
2	8	147±17.1	127	175	
3	42	137±22.0	90	207	
4	33	140±24.9	101	200	
5	10	142±21.9	92	170	
total	95	139	90	207	0.7949

*Mean±standard deviation.

†One way analysis of variance (ANOVA) signifcance.

‡Europe-American.

Table 43. **Drinking status* by dietary complexity, all origin groups combined**

group	dietary complexity†				total		sig‡
	low		high				
	n	%	n	%	n	%	
fathers							
users	227	66.2	294	67.9	521	67.1	
non users	116	33.8	139	32.1	255	32.9	
total	343	44.2	433	55.8	776	100.0	0.6680
boys							
users	66	32.0	99	32.9	165	32.5	
non users	140	68.0	202	67.1	342	67.5	
total	206	40.6	301	59.4	507	100.0	0.9168
mothers							
users	54	27.4	76	30.6	130	29.2	
non users	143	72.6	172	69.4	315	70.8	
total	197	44.3	248	55.7	445	100.0	0.5220
girls							
users	28	14.2	32	13.7	60	13.9	
non users	169	85.8	202	86.3	371	86.1	
total	197	45.7	234	54.3	431	100.0	0.9832

*Drinking status: user defined as reporting comsumption of alcoholic beverage other than one glass or less of wine during previous week.

†Complexity defined as low/high: below/above mean scale score for each origin group.

‡X^2 significance.

Table 44. Drinking status* by Guttman scale score all origin groups

group	Guttman Scale Scores												
	1		2		3		4		5		total		sig†
	n	%	n	%	n	%	n	%	n	%	n	%	
fathers													
user	23	66	134	65	167	67	160	69	37	68	521	67	
non user	12	34	71	35	83	33	72	31	17	32	255	33	
total	35	4	205	26	250	32	232	30	54	7	776	100	0.9470
boys													
user	9	47	41	38	50	26	56	38	10	24	166	33	
non user	10	53	68	62	143	74	90	62	31	76	342	67	
total	19	4	109	22	193	38	146	29	41	8	508	100	0.0326‡
mothers													
user	2	10	39	32	37	28	47	32	5	24	130	29	
non user	18	90	85	68	96	72	100	68	16	76	315	71	
total	20	5	124	28	133	30	147	33	21	5	445	100	0.3048
girls													
user	1	6	15	16	25	14	15	13	4	17	60	14	
non user	17	94	82	85	149	86	103	87	20	83	371	86	
total	18	4	97	23	174	40	118	27	24	6	431	100	0.8146

*Drinking status: user defined as reporting consumption of alcoholic beverage other than one glass or less of wine during previous week.

† X^2 significance

‡ $X^2_4 = 10.5137$.

Table 45A. Frequency of beer consumption by dietary complexity*, gender and generation, all origin groups combined

group	n	mean†	sig‡
fathers			
low	320	1.33±2.69	
high	406	1.11±2.57	0.274
boys			
low	178	0.38±0.87	
high	269	0.55±2.42	0.273
mothers			
low	151	0.16±0.50	
high	193	0.22±0.50	0.241
girls			
low	153	0.08±0.28	
high	189	0.08±0.35	0.993

*Complexity defined as low/high: below/above mean scale score for each origin group.

†Mean number of drinks per week±standard deviation.

‡Significance of student's t Test.

Table 45B. Frequency of spirits consumption by dietary complexity*, gender and generation, all origin groups combined

group	n	mean†	sig‡
fathers			
low	320	0.34±1.27	
high	406	0.28±1.18	0.496
boys			
low	178	0.04±0.33	
high	269	0.07±0.55	0.540
mothers			
low	151	0.07±0.45	
high	193	0.05±0.30	0.621
girls			
low	153	0.01±0.11	
high	189	0.05±0.23	0.122

*Complexity defined as low/high: below/above mean scale score for each origin group.

†Mean number of drinks per week±standard deviation.

‡Significance of student's t Test.

Table 45C. Frequency of cordials consumption by dietary complexity*, gender and generation, all origin groups combined

group	n	mean†	sig‡
fathers			
low	320	1.17±3.72	
high	406	1.08±2.83	0.721
boys			
low	178	0.15±0.50	
high	269	0.25±1.06	0.184
mothers			
low	151	0.27±0.73	
high	193	0.28±0.80	0.921
girls			
low	153	0.06±0.24	
high	189	0.07±0.36	0.641

*Complexity defined as low/high: below/above mean scale score for each origin group.

†Mean number of drinks per week±standard deviation.

‡Significance of student's t Test.

Table 46. **Smoking status in high and low dietary complexity categories*
by gender, and generation, all origin groups combined**

group	current smoker		never or former >2 yrs		former smoker <2 yrs		total		sig†
	n	%	n	%	n	%	n	%	
fathers									
low	138	40	188	55	17	5	343	44	
high	176	41	235	54	22	5	433	56	
total	314	40	423	54	39	5	776	100	0.9880
boys									
low	71	34	130	63	5	2	206	41	
high	84	28	211	70	5	2	300	60	
total	155	31	341	67	10	2	506	100	0.2264
mothers									
low	50	25	145	74	2	1	197	44	
high	53	21	190	77	5	2	248	56	
total	103	23	335	75	7	2	445	100	0.4507
girls									
low	35	13	157	80	5	3	197	46	
high	35	15	196	84	3	1	234	54	
total	70	16	353	82	8	2	431	100	0.4397

*Complexity defined as low/high: below/above mean scale for each origin group.

†X_2 significance.

Table 47. Frequency of cigarette smoking by high and low dietary complexity categories* for current smokers, by gender and generation, all origin groups combined

group	individuals	mean†	sig‡
	n	no. of cigarettes per day	
fathers			
low	138	20.4±13.6	
high	175	20.3±14.6	0.957
boys			
low	69	12.1±10.3	
high	79	13.4±12.0	0.461
mothers			
low	46	14.2±12.3	
high	51	13.0±11.8	0.6220
girls			
low	32	8.0±6.5	
high	32	7.1±5.3	0.560

*Complexity defined as low/high: below/above mean scale score for each origin group.

†Mean±standard deviation.

‡Significance of student's t Test.

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