PREFERENCES OF KIKUYU MOTHERS FOR CHILDREN'S FOODS

Jan Hoorweg & Rudo Niemeyer

1978
N. 4

SUMMARY

A study on the preferences of Kikuyu mothers for children's foods was conducted using the method of paired comparisons. Results show that these women have consistent preferences. This applies equally to choices between foods from the same food groups as to choices between foods from different groups. Reliability estimates for the group results are high. A preference scale is developed that attempts to measure, independent of each other, preferences for protein foods and preferences for calorie foods.

The women showed a great liking for foods with a high calorie and a high protein content, such as beans,peas and eggs. Next preferred are foods of low nutritional values such as plantain and Irish potatoes, foods that are lacking in these two qualities. Foods with a high calorie and medium protein content, such as maize flour and rice, are least preferred.

Part 1. PREFERENCES FOR CHILDREN'S FOODS

1.1 Introduction

An important objective of many child nutrition programmes
is to bring about changes in food preferences especially the
foods given to small children. Comprehensive evaluation of
such programmes should therefore include an assessment of
changes in these preferences and requires instruments to
measure them. In the first part of this paper the feasibility
of the method of paired comparisons is explored and findings
are presented on the actual preferences of Kikuyu mothers.
In the second part of the paper a preference scale is developed.
This scale will be employed in the further course of this
research project.

Previous research in Uganda has shown that the so-called
'paired comparison method', in which a respondent chooses
which of two alternatives she prefers, is particularly suited
for studying the food preferences of African mothers (Hoorweg
& McDowell, 1978). One difficulty encountered in these
Ugandan studies, however, was that the respondents often were
unable to choose between foods belonging to different food
groups. Therefore, one purpose of the present study was to
find out what foods Kikuyu mothers are willing and able to
compare. This was done by giving mothers a series of choices,
at first between ~~from~~ foods from the same food group and
later between foods from different groups. The choice of
food groups and of foods within each group was made on the
basis of a previous study (Hoorweg & Niemeyer, 1978) where we
found that Kikuyu mothers distinguish at least six major food
groups : cereals, legumes, vegetables, fruits, meats and
animal products, and roots and tubers.

1.2 Method of paired comparisons

The method of paired comparisons was originally developed by
Thurstone, and the statistical assumptions and calculation
procedures are discussed in Kendall (1948) and Torgerson (1958)
and more simply in Edwards (1957). The data collected with
this method can be interpreted straightforwardly but also
can be analyzed using the more advanced scaling models which

have been developed over the last decade.

In the method of paired comparisons respondents are asked
to compare two stimuli and to select which one they prefer,
according to certain criteria. For example, if the stimuli
are foods, the respondent may be asked to select which of
two foods is 'better', has a higher food value, is preferred,
and so forth. Several stimuli generally are employed, and
usually all possible pairings or comparisons are presented.

The number of comparisons increases rapidly with the
number of stimuli. For example, 3 foods give 3 possible
comparisons, 6 foods give 15 possible comparisons and 12 foods
give 66 possible comparisons. For each comparison between
two stimuli the proportion of respondents choosing the one or
the other alternative can be computed, and when stimuli are
present in more than one comparison, as is usually the case,
the average proportion of choices for each stimulus can be
computed.

1.3 Method

Mothers of small children attending a MCH clinic at Kiambu
town, a dispensary at Kambaa village and a MCH clinic at
Kigumo village were presented with comparisons between the
foods that are listed in table 1. The names of two foods
were mentioned, and the mothers were asked to choose 'which
food would you prefer to give to a two-year-old child'.

The study was conducted in three stages. In the first
stage (schedules 1A and 1B) the mothers were asked for their
preferences between foods within the same food groups : meats
and animal products, cereals, fruits, vegetables, legumes,
and roots and tubers. For example, the respondents were
asked to choose between the three possible combinations of
the fruits mango, orange and sweet banana, but not between
fruits and foods from other groups. The two most preferred
foods from each group were used in the subsequent stages.

In the second stage foods from different, but still some-
what related, food groups were compared with each other
(schedules 2A and 2B). In schedule 2A mothers were asked to
choose between the two most popular flours, the two most

Table 1. FOODS INCLUDED IN THE DIFFERENT INTERVIEW SCHEDULES

Study 1. Foods belonging to the same food groups

(1A) Comparisons between meats and animal products only,
cereals only, and fruits only.

-beef	-maize flour	-mango
-chicken	-millet flour	-orange
-eggs	-wheat flour	-sweet banana
-goat meat		

(1B) Comparisons between vegetables only,
legumes only, and roots and tubers only.

-cabbage	-beans	-Irish potato
-cowpea leaves	-peas	-plantain
-kale	-pigeon peas	-sweet potato
-pumpkin leaves		

Study 2. Foods belonging to the same and to related food groups

(2A) (Cereals, roots and tubers)	(2B)(Vegetables, legumes, meats and animal products)
-maize flour	-eggs
-millet flour	-meat
-maize(whole grain)	-cabbage
-rice	-kale
-Irish potato	-beans
-plantain	-peas

Study 3. Foods belonging to different food groups
(Meats and animal products, cereals, fruits, vegetables, legumes,
roots and tubers)

(3A)	(3B)
-eggs	-meat
-millet flour	-maize flour
-orange	-sweet banana
-rice	-rice
-kale	-cabbage
-beans	-peas
-plantain	-Irish potato

popular roots and tubers and maize and rice. All of the
15 possible comparisons were presented to the respondents.
In schedule 2B mothers were asked to choose between all
possible combinations of the two most popular animal products,
the two most popular vegetables and the two most popular
legumes.

In the third stage, mothers chose between all kinds of
foods. The schedules for this study (3A and 3B) contained
one food from each of the six major food groups that are
distinguished by Kikuyu mothers. The most popular foods were
combined in schedule 3A, the second most popular foods in
schedule 3B. Each schedule also included rice. The total
number of possible comparisons is 21.

The number of respondents for each study and the areas
where they come from can be found in table 2.

Table 2. NUMBER OF RESPONDENTS FROM DIFFERENT AREAS INTERVIEWED WITH DIFFERENT SCHEDULES.				
Study	N,total	Kiambu	Kambaa	Kigumo
1A	80	40	40	-
1B	80	40	40	-
2A	80	20	40	20
2B	80	20	40	20
3A	80	20	40	20
3B	80	20	40	20

For each of the six schedules (1A,B;2A,B;3A,B) the
groups of respondents were randomly split into two. The
similarity of the preference patterns in the two resulting
'half' groups indicates the stability of preferences. For
each item (=each comparison) two proportions were obtained,
one for each of the two 'half' groups. These two figures,
together with the two proportions for each of the other items
can be entered into a correlation computation. The resulting
coefficient indicates the similarity between the results in
the two groups and as such is a measure of reliability [1].

1.4 Results : Reliability

The mothers had no difficulty in choosing between foods,
neither when these foods were drawn from the same food groups
nor when they were drawn from different groups. Their
answers also show definite and consistent patterns and the
reliability estimates for the different schedules confirm
that they do not answer haphazardly. As shown in table 3 the
correlations between the results of the 'half' groups are not
only high but, more or less, constant for the different
schedules.

If our respondents had not been able to compare foods from
different food groups or had been unable to choose meaning-
fully between them, the reliability of their choices would
have declined, that is the reliability of schedules 2A would
have been lower than the reliability of schedules 1A and 1B,

Table 2. NUMBER OF RESPONDENTS FROM DIFFERENT
AREAS INTERVIEWED WITH DIFFERENT SCHEDULES.

Study	N,total	Kiambu	Kambaa	Kigumo
1A	80	40	40	--
1B	80	40	40	--
2A	80	20	40	20
2B	80	20	40	20
3A	80	20	40	20
3B	80	20	40	20

For each of the six schedules (1A,B;2A,B;3A,B) the
groups of respondents were randomly split into two. The
similarity of the preference patterns in the two resulting
'half' groups indicates the stability of preferences. For
each item (=each comparison) two proportions were obtained,
one for each of the two 'half' groups. These two figures,
together with the two proportions for each of the other items
can be entered into a correlation computation. The resulting
coefficient indicates the similarity between the results in
the two groups and as such is a measure of reliability [1].

1.4 Results : Reliability

The mothers had no difficulty in choosing between foods,
neither when these foods were drawn from the same food groups
nor when they were drawn from different groups. Their
answers also show definite and consistent patterns and the
reliability estimates for the different schedules confirm
that they do not answer haphazardly. As shown in table 3 the
correlations between the results of the 'half' groups are not
only high but, more or less, constant for the different
schedules.

If our respondents had not been able to compare foods from
different food groups or had been unable to choose meaning-
fully between them, the reliability of their choices would
have declined, that is the reliability of schedules 2A would
have been lower than the reliability of schedules 1A and 1B,

Table 3. 'SPLIT-HALF' RELIABILITY ESTIMATES
FOR DIFFERENT INTERVIEW SCHEDULES

Study	r	r,corrected[a]
1A	.96	.98
1B	.96	.98
2A	.94	.97
2B	.87	.93
3A	.92	.96
3B	.95	.97

-a- Each half consists of 40 persons. Since
the proportions presented for the different
studies are all based on samples of
80 people, corrected estimates according to
Spearman-Brown are also presented.

and the reliability of schedules 3A and 3B would have been
lowest of all. The fact that no such decline was found
indicates that the choices made between foods from different
food groups are as meaningful as the choices made between
foods from the same food group.

The incidence of circular triads[2] in the different studies
confirms this. Again, if comparing foods from different food
groups is not meaningful, one would expect respondents to
become less consistent in their choices and the number of
circular triads would increase from stage 1 to stage 3. Table
4   presents the average number of circular triads together
with the total number of triads present in each schedule,
after correction for very unpopular foods that hardly receive
any choices[3]. There is no noticeable increase in circular
triads with the exception of schedule 3A. This interview
schedule contained the foods that were most preferred during
the previous stages, which suggests that respondents find it
more difficult to choose consistently between very popular
foods.

1.5 Results : Preferences

The actual preferences expressed by the mothers are presented
in detail in appendices 1, 2 and 3 where for each comparison
the proportion of choices for each food can be found. From

Table 4. INCIDENCE OF CIRCULAR TRIADS
IN DIFFERENT STUDIES[a]

Study	Average number per person(A)	Number of triads presented(B)	Average proportion per person (A/B x 100%)
1A	.3	5	6%
1B	.8	6	13%
2A	1.3	10	13%
2B	2.6	20	13%
3A	3.5	20	18%
3B	3.8	35	11%

[a] For a discussion of calculations and corrections see text and note 3.

these figures the average proportion of choices for each food was also computed, and these figures are presented in tables 5, 6 and 7. For example, the proportion of respondents preferring oranges over mango and sweet banana is .95 and .51 respectively (appendix 1). The average proportion of choices for oranges therefore is .73, the figure in table 5.

Table 5
STUDY 1 : AVERAGE PROPORTION OF CHOICES FOR DIFFERENT FOODS

(1A)		(1B)	
Meats and animal products		Vegetables	
eggs	.90	kale	.84
chicken	.55	cabbage	.51
goat meat	.30	cowpea leaves	.37
beef	.26	pumpkin leaves	.28
Cereals		Legumes	
millet flour	.91	beans	.81
maize flour	.46	peas	.45
wheat flour	.14	pigeon peas	.25
Fruits		Roots and tubers	
orange	.73	plantain	.69
sweet banana	.73	Irish potato	.55
mango	.04	sweet potato	.27
N=80			

The results for the first study, where only comparisons between foods from the same food groups were drawn, are not surprising for those familiar with the diet of the Kikuyu child (table 5). The high preference for finger millet, a cereal which was grown traditionally but now is far less easily available in this part of Kenya, can be explained because, together with sorghum, it is used to prepare ucuru, children's porridge. Somewhat surprising, perhaps, is the high preference for oranges, a fruit which is far less common than, for example, sweet bananas. Among the animal products preferences seem related to tenderness; beef, which generally is rather tough, is the least preferred meat or animal product for children. Irish potato which was only introduced at the beginning of this century is far more popular for children than the older sweet potato. The mothers' liking for kale, or sukuma, is even more recent, dating from the last ten to fifteen years.

In the second stage of this study respondents chose between various combinations of staple foods. Plantain and millet flour are by far the most popular foods followed by maize flour and Irish potatoes (table 6). Rice and whole grain maize are the least popular staple foods for children. Although maize is one of the major staple foods for the adult Kikuyu it usually is not given as a whole grain to children of less than 3 years of age. Another group of respondents chose between the 15 possible combinations of animal products,

Table 6
STUDY 2 : AVERAGE PROPORTION OF CHOICES FOR DIFFERENT FOODS

(2A) Cereals, roots and tubers		(2B) Vegetables, legumes, meats and animal products	
plantain	.74	beans	.75
millet flour	.69	eggs	.60
maize flour	.51	kale	.56
Irish potato	.45	meat	.40
rice	.43	peas	.39
maize (whole grain)	.19	cabbage	.31

N=80

vegetables and legumes. Beans are the most preferred food, followed by eggs and kale. Meat, peas and cabbage follow lower on the list.

In the third stage, foods from different food groups were compared. It is evident that high protein foods such as beans, eggs, meat and peas usually obtain a high proportion of choices, whereas the staple foods such as rice, potato, millet flour and maize flour are less favoured (table 7). This order of preference is, however, not strictly according to protein content or caloric value, as is shown by the high preference for sweet banana and vegetables and by the low preference for rice, when compared to nutritionally poorer foods such as plantain and Irish potato.

Table 7
STUDY 3 : AVERAGE PROPORTION OF CHOICES FOR DIFFERENT FOODS

(3A)		(3B)	
beans	.73	meat	.73
eggs	.70	sweet banana	.67
kale	.57	cabbage	.66
plantain	.47	peas	.63
millet flour	.46	maize flour	.29
orange	.43	Irish potato	.27
rice	.14	rice	.25

N=80

1.6 Results : Regional variation

Since people living in different areas may have different
food preferences it is important to gain some estimate of
the variation of preferences. We were, first, interested
in the difference between the preferences of women living
in remote, rural conditions and women living within easy
reach of an urban concentration of health facilities and
other services. Secondly, we were interested in the
difference between the preferences of women living in the
two major ecological zones within Central Province. That is,
between women living in the cool, wet, tea zone up on the
slopes of the Nyandarua mountain range and women living in
the hotter, drier, coffee zone spreading towards the Athi
plains. Kiambu and Kambaa combine these contrasts.

Kiambu is a small town 15 km north from Nairobi, situated
in the coffee zone. Most mothers attending the MCH clinic
at the local hospital live outside Kiambu itself but usually
within easy reach of the town. Kambaa is a small village,
50 km northwest of Nairobi, situated in the tea zone and
25 km distant from Limuru the nearest township. These two
areas combine the urban-rural difference outlined above with
the difference between coffee and tea zones.

Interview schedules 2A, 2B, 3A and 3B were each presented
to 20 mothers attending the MCH clinic at Kiambu hospital and
40 mothers attending the Kambaa dispensary (see table 2).

Table 2. CORRELATIONS BETWEEN PREFERENCES IN
DIFFERENT AREAS FOR DIFFERENT STUDIES

Study	Kambaa-Kiambu		Kambaa-Kigumo	
	r	r,corrected -a-	r	r,corrected -a-
2A	.86	.96	.94	≈1.00
2B	.80	.99	.87	≈1.00
3A	.83	.94	.74	.86
3B	.82	.95	.85	.90

-a- The usual correction for attenuation was
applied utilizing reliabilities calculated for
Kambaa,Kiambu and Kigumo data separately.

Preferences in the two areas were found to be very similar
and this similarity can be expressed as a correlation
obtained by means of the same calculation that was used for
the split-half results (page 4). After correction for the
respective reliabilities of the Kambaa and the Kiambu data,
these correlations should come close to 1.00 if no differences
in food preferences exist between women in the two ecological
zones or between rural women and women living near the town.
Since the correlations are indeed close to unity, it can
safely be concluded that such differences are negligible.

A third contrast is that between women living in different
districts within Central Province, which, although part of the
Kikuyu homeland, show minor cultural differences. The present
research project is to a large extent conducted in Kiambu
and Murang'a districts. Results for the women in Kambaa
(Kiambu district) were therefore compared with those of mothers
of young children attending a MCH clinic at Kigumo in Murang'a.
Kigumo is situated in the centre of this district at the
altitude where coffee and tea zones meet. The distance to
Murang'a town is roughly 35 km; Nairobi lies some 100 km to
the South. Again the corrected correlations are close to
unity which confirms that regional differences within Kikuyu
territory are, at the most, very small.

1.7 Conclusion

Several conclusions can be drawn regarding the development
of scales to measure food preferences among Kikuyu mothers.
First, Kikuyu mothers can be asked to choose between foods
from different food groups without a loss in reliability or
consistency. Second, although there is a high consensus
regarding preferences, there is also an important minority
of women who differ in their likings. Third, the high
reliability coefficients obtained for relatively small samples
of 80 women show that studies of changes in food preferences
can be carried out with fairly small groups of respondents.
Finally, food preferences among these Kikuyu women coincide
to some extent, but not completely, with the nutritional
value of the foods.

Part 2. PREFERENCE SCALE

2.1 Introduction

Nutrition intervention in Africa, as well as other developing
countries, has emphasized the importance of proteins in the
diet of young children. McLaren (1974) was one of the first
to argue that children's need for calories generally has
not received the attention it deserves. He, and others, have
argued that the importance of calories in the young child's
diet should be emphasized. Consequently, nutrition education
should stress the need for foods that are high in calories
as well as those that are high in proteins.

Therefore to assess the effectiveness of programmes of
nutrition education, it is important to measure mothers'
preferences for protein foods and for calorie foods separately
and to determine whether these preferences change as a result
of the education.

The main purpose of this study was to develop an instrument
that can do just that. The difficulty here is that the
common high protein foods are also high in calories. For
example, the popular beans are high in proteins as well as
in calories, and a choice for this food is a choice for these
two nutritional components together. The present preference
scale consists of comparisons that enable us to distinguish
between the preferences for high calorie foods on the one
hand and for high protein foods on the other hand.

2.2 Method

The scale that is presented here consists of choices between
three types of foods : Group A - foods with both a high
calorie and a high protein content ; Group B - foods with
a high calorie content and a much lower protein content ;
Group C - foods low both in proteins and calories[4]. Each
group consists of four foods (see table 9). With four foods
in each group, there are 16 possible Group A-Group B
comparisons, 16 possible Group B - Group C comparisons and
16 possible Group A-Group C comparisons, 48 comparisons in
all. A schedule of 48 comparisions was deemed too long to

Table 9. NUTRIENT CONTENT OF FOODS INCLUDED IN GROUPS A,B, AND C (PER 100 GRAMS OF EDIBLE PORTION)

		Calories	Proteins(gms)
	Beans	339	24.0
Group A:	Peas	337	25.0
	Eggs	158	13.0
	Meat	262	16.0
	Maize flour	362	9.5
Group B:	Rice	352	7.0
	Millet flour	332	5.5
	Kale	48	5.0
	Plantain	128	1.0
Group C:	Orange	53	0.8
	Irish potato	75	2.0
	Cabbage	23	1.5

Source : Platt (1962)

be given to our respondents. Therefore, the interview schedule was split in two, each half consisting of 8 Group A-Group B comparisons, 8 Group B-Group C comparisons, and 8 Group A - Group C comparisons, 24 comparisons in all, selected in such a way that each food appeared the same number of times in each schedule (4A and 4B). The exact comparisons included in each schedule can be found in appendix 4.

Each schedule of 24 comparisons was presented to 120 Kikuyu mothers with young children at the same centres where the previous studies were conducted (40 mothers in Kiambu, 40 in Kambaa and 40 in Kigumo).

2.2 Results : Preferences

The proportion of preferences for each comparison can be found in table 10 where they are presented in a condensed matrix.

Group A-Goup B comparisons   Foods in both Group A and Group B are high in calories, but differ in protein content. The degree to which a respondent prefers Group A foods over Group B foods indicates the degree to which she prefers high-protein foods over low-protein foods for a young child.

Table 10
STUDY 4 : THE PROPORTIONS OF RESPONDENTS PREFERRING DIFFERENT FOODS, PRESENTED FOR INDIVIDUAL COMPARISONS

		Group B				Group C			
		maize fl.	rice	millet fl.	kale	plantain	orange	I.potato	cabbage
Group A	beans	.92	.93	.75	.74	.73	.68	.86	.71
	peas	.72	.88	.49	.44	.48	.37	.73	.51
	eggs	.88	.87	.78	.66	.74	.63	.83	.67
	meat	.81	.81	.62	.45	.59	.53	.82	.55
Group B	maize flour	.		.		.15	.34	.53	.25
	rice		.		.	.28	.14	.38	.06
	millet flour	.		.		.53	.45	.67	.33
	kale		.		.	.50	.58	.81	.66

Legend: Each cell contains the proportion of respondents
preferring the food on the left hand side of the table. For
example, 92% of the respondents prefers beans over maize flour

N=120

The results show that, when the caloric value of foods is
high and more or less constant , mothers prefer high protein
foods. On average, the proportion of respondents preferring
the high protein foods - beans, peas, eggs and meat - is .73,
and the proportion of those preferring low protein foods is
only .27. Assuming that these mothers are representative of
Kikuyu mothers in general we find a strong preference   for
foods with a high protein content.

Group B-Group C comparisons   Foods in Groups B and C have
in common a low protein content, although the foods in
Group B contain slightly more proteins. The major difference
between the foods in the/groups is in their calorie content,
and the 16 Group B-Group C comparisons measure the mothers'
preference for calories in a child's diet. The results
show that the average proportion of respondents choosing the
high calorie foods is only .42. Thus, 58 percent of the
mothers preferred nutritionally poorer foods - plantain ,

Irish Potato, cabbage and orange. This is not only caused by a
preference for oranges but by preferences for the other three
foods as well. Thus, we find that when proteins are more
or less constant, Kikuyu mothers have a preference for low
calorie foods.

Group A-Group C comparisons. Foods in Group A are high in
both calories and proteins and foods from Group C are low
in both respects. The comparisons between the foods in these
two groups confirm the previous findings. In the last section
we found that Kikuyu mothers least favour foods that are low
in proteins and high in calories (Group B). They favour low
protein - low calorie foods more for their children.
Consequently, when low protein-low calorie foods (Group C) are
compared with the high protein-high calorie foods (Group A)
one would expect that preferences for the two groups would
be less far apart than was the case with the comparisons
between foods from Group A and foods from Group B. The
average proportion of respondents choosing Group A over Group
C foods is indeed only .65, while it was .73 for the
comparisons between foods from group /A\ and group /B/.

Apparently, Kikuyu women have a preference for high protein
foods on the one hand and for low calorie foods on the other
hand. Further analysis confirms this. Correlations were
computed for the average proportion of choices for each food
with protein content and with calorie content respectively.
The average proportion of choices, i.e. the preferences,
correlate .51 with the protein content and -.15 with the
caloric value of the foods. Since calories and proteins are
themselves correlated these figures require correction.
Calculation of the partial correlations raises these figures
to .81 and -.74 respectively. This means that there is a
strong positive relation between preferences and proteins
and a strong negative relation between preferences and
calories among these women. Together the variation in calorie
and in protein content explains 63% of the differences in
preferences for the different foods[5].

These findings can be read in two ways. First, group
preferences as measured with this scale can, to an important
extent be explained by differences in nutritional values ;
this demonstrates the validity of the scale. Second, although
Kikuyu women may not actually think in terms of proteins and
calories their food preferences in effect consist of a
preference for foods with a high protein content on the one
hand and of a preference for foods with a low caloric value on
the other hand. This suggests, at least, that the importance
of foods with a high caloric value should be stressed more
in nutrition education. To put this more concretely : the
highly nutritious foods such as beans, eggs, peas and meat
are already highly preferred but what also needs emphasis
is the importance for children of foods with high caloric
values such as millet flour, maize flour and rice.

3.CONCLUSION

The method of paired comparisons is well suited for use among
rural women with limited education as the remarkably stable
results of this study demonstrate. This method has great
advantages over other attititude measures, particularly in
situations where interviews can not be given in written form.
Only one or a few basic questions are used throughout the
interview which reduces the chance of misunderstandings. This
risk is much greater in other attitude measures where usually
many questions are asked, questions that are often long and
that often rely on subtleties of phrasing that are easily
lost in oral interviews. The paired comparison method also
has the advantage that respondents have to choose between
only two alternatives. Rural, uneducated respondents prefer
this over other response methods that either have more
alternatives, rely on ratings, or use open ended questions.
The paired comparison interviews also tend to take little
time. Moreover, the method lends itself to straightforward
analysis and interpretation as well as to analysis with
advanced scaling methods.

The analysis that was presented here has been concerned
mainly with matters of reliability and consistency and has

been limited to group preferences. Other methods of
analysis will be tried at a later stage. Among them is,
first, the possibility of weighing choices for the nutritional
values of the foods included in the comparisons. A second
possibility is to construct preference spaces for individuals
and for groups. This should give insight into the food
characteristics that Kikuyu women take into consideration
in their choices and how they weigh these different dimensions.
The preference scale that was presented in the second part
of the paper will be used in the further course of this
project; the two nutrition surveys in Murang'a district and
the evaluation studies at nine child nutrition clinics.

In anticipation of these studies, the present findings
indicate that foods with a high protein content (and which
also have high caloric values) are widely preferred among
Kikuyu mothers. Studies in Uganda have found this also to
be the case among other African women (Hoorweg & McDowell,1978).
At the same time, however, there is the finding that next
preferred are foods that are low in calories and low in
proteins, such as plantain, potatoes and cabbage. It is likely
that mothers will fall back on the low protein-low calorie
foods such as plantain, Irish potato and cabbage when the
high protein -high calorie foods such as beans, peas, meat,
eggs are not available. This suggests that in nutrition
education among these women serious attention should be paid
to foods of high caloric value such as maize flour, millet
flour and rice while the tendency until now has been to
concentrate mainly on foods with a high protein content.

NOTES
(1) These reliability coefficients differ from ordinary
split-half coefficients. Usually the group of items is
split into two but in the present case the group of respondents
is divided into two. In other words, the usual split-half
method and the present one differ in that items and
respondents have been interchanged. As a consequence the
present coefficients do not estimate the reliability of
individual preferences. They do, however, indicate the

NOTES

(1) These reliability coefficients differ from ordinary
split-half coefficients. Usually the group of items is split
into two but in the present case the group of respondents is
divided into two. In other words, the usual split-half method
and the present one differ in that items and respondents have
been interchanged. As a consequence the present coefficients
do not estimate the reliability of individual preferences.
They do, however, indicate the precision by which the obtained
proportions estimate the true proportions in the population.
A high reliability in this sense means that differences between
groups can be estimated with a high degree of confidence. This
method for calculating reliabilities was also used by
Stefflre (1972).

(2) A circular triad occurs when a repondent prefers
A over B; and B over C but instead of choosing A over C, as
could be expected, she chooses C. When more than three stimuli
are studied more complicated inconsistencies may occur involving
more than three foods but for purposes of analysis these are
usually broken down into triads.

(3) Each of the schedules was examined for the presence of foods
that are significantly more or significantly less involved in
circular triads than the other foods in the same schedule. This
is the case for three foods, respectively in schedules 1A, 2A and
3A. On all three occasions this concerns foods with very low
preference scores; foods which are therefore rarely involved in
circular triads and thus artificially reduce the number of
circular triads. For that reason these three foods were omitted
from this particular analysis.

(4) As can be seen from table 9, all foods that were used in
this study meet these requirements, with the exception of one
food in group B, kale. Like other foods in this group its
protein content is medium, but unlike the other foods its caloric
value is low. Kale was used because of the lack of feasible
alternatives and because of its important role in the Kikuyu diet
and in nutrition education. In further analysis, falling outside
the scope in this paper, the calorie and protein content of
each food will be taken into account but for the present kale is
included in the (B) group.

(5) Also taking into account the vitamin and the mineral content
of the foods, using an additive index of iron, calcium, vitamin A,
thiamine and ascorbic acid does hardly increase the total
proportion of explained variance.

Edwards, A.L. (1957). Techniques of attitude and scale construction. New York : Appleton Century Crofts.

Hoorweg, J. and McDowell, I. (1978). Evaluation of nutrition education in Africa : Community studies from Uganda, 1971-72. The Hague : Mouton. In press.

Hoorweg, J. and Niemeyer, R. (1978). Classification of foods among the Kikuyu. University of Nairobi : Bureau of Educational Research, mimeographed paper.

Kendall, M.G. (1948) Rank correlation methods (Third edition, 1970). London : Griffin.

McLaren, D.S. (1974) The great protein fiasco. Lancet,(2), 93-6.

Platt, B.S. (1962). Tables of representative values of foods commonly used in tropical countries. London : HMSO

Torgerson, W.(1958). Theory and methods of scaling. New York : Wiley.

Stefflre, V.J. (1972). Some applications of multidimentional scaling to social science problems. In A.K. Romney, R.N. Shepard, S.B. Nerlove (Ed.) Multidimensional scaling, Vol II : Applications. New York : Seminar Press

Appendix 1.

STUDY 1 : THE PROPORTIONS OF RESPONDENTS PREFERRING DIFFERENT FOODS,
PRESENTED FOR INDIVIDUAL COMPARISONS

(1A) Comparisons between animal products only, cereals only
and fruits only (N=80)

	1	2	3	4	5	6	7	8	9	10
1. Beef	—	.28	.10	.39						
2. Chicken	.72	—	.18	.74						
3. Eggs	.90	.82	—	.97						
4. Goat meat	.61	.26	.03	—						
5. Maize flour					—	.11	.80			
6. Millet flour					.89	—	.92			
7. Wheat flour					.20	.08	—			
8. Mango								—	.05	.03
9. Orange								.95	—	.51
10. Sweet banana								.97	.49	—

(1B) Comparisons between vegetables only, legumes only,
and roots and tubers only (N=80)

	1	2	3	4	5	6	7	8	9	10
1. Cabbage	—	.66	.11	.76						
2. Cowpea lvs.	.34	—	.18	.59						
3. Kale	.89	.82	—	.81						
4. Pumpkin lvs.	.24	.41	.19	—						
5. Beans					—	.77	.85			
6. Peas					.23	—	.66			
7. Pigeon peas					.15	.34	—			
8. Irish potato								—	.28	.82
9. Plantain								.72	—	.65
10. Sweet potato								.18	.35	—

Legend : Each cell contains the proportion of respondents preferring
the food on the left hand side of the table. For example, 28% of
the respondents prefers beef over chicken.

Appendix 2.

STUDY 2 : THE PROPORTIONS OF RESPONDENTS PREFERRING DIFFERENT FOODS,
PRESENTED FOR INDIVIDUAL COMPARISONS

(2A) Comparisons between cereals, roots and tubers (N=80)

	1	2	3	4	5	6
1. Maize flour	—	.21	.85	.57	.56	.33
2. Millet flour	.79	—	.87	.72	.76	.30
3. Maize	.15	.13	—	.28	.25	.14
4. Rice	.43	.28	.72	—	.44	.30
5. Irish potato	.44	.24	.75	.56	—	.25
6. Plantain	.67	.70	.86	.70	.75	—

(2B) Comparisons between animal products, vegetables and legumes (N=80)

	1	2	3	4	5	6
1. Eggs	—	.86	.67	.49	.31	.65
2. Meat	.14	—	.59	.41	.35	.50
3. Cabbage	.33	.41	—	.19	.23	.39
4. Kale	.51	.59	.81	—	.21	.67
5. Beans	.69	.65	.77	.79	—	.84
6. Peas	.35	.50	.61	.33	.16	—

Legend : Each cell contains the proportion of respondents preferring
the food on the left hand side of the table. For example, 21% of
the respondents prefers maize flour over millet flour.

Appendix 3

STUDY 3 : THE PROPORTIONS OF RESPONDENTS PREFERRING DIFFERENT FOODS,
PRESENTED FOR INDIVIDUAL COMPARISONS

(3A) Comparisons between foods from different food groups (N=80)

	1	2	3	4	5	6	7
1. Eggs	—	.59	.77	.99	.66	.41	.80
2. Millet flour	.41	—	.39	.84	.34	.19	.57
3. Orange	.23	.61	—	.74	.26	.34	.38
4. Rice	.01	.16	.26	—	.18	.14	.11
5. Kale	.34	.66	.74	.82	—	.39	.48
6. Beans	.59	.81	.66	.86	.61	—	.85
7. Plantain	.20	.43	.62	.89	.52	.15	—

(3B) Comparisons between foods from different food groups (N=80)

	1	2	3	4	5	6	7
1. Meat	—	.85	.59	.90	.65	.54	.85
2. Maize flour	.15	—	.15	.56	.14	.16	.59
3. Sweet banana	.41	.85	—	.82	.49	.54	.90
4. Rice	.10	.44	.18	—	.15	.20	.46
5. Cabbage	.35	.86	.51	.85	—	.57	.79
6. Peas	.46	.84	.46	.80	.43	—	.80
7. Irish potato	.15	.41	.10	.54	.21	.20	—

Legend : Each cell contains the proportion of respondents preferring
the food on the left hand side of the table. For example, 59% of
the respondents prefers eggs over millet flour.

Appendix 4

INTERVIEW SCHEDULES 4A and 4B

(4A)			(4B)	
Beans – maize flour	A-B	1*	Peas – maize flour	1*
Peas – rice	A-B	2	Beans – rice	2
~~Eggs – kale~~	~~A-B~~	~~3~~	Eggs – millet flour	3
Meat – millet flour	A-B	4	~~Meat – kale~~	~~4~~
Peas – millet flour	A-B	9	Eggs – rice	11
Eggs – maize flour	A-B	10	Meat – maize flour	12
Meat – rice	A-B	11	Beans – millet flour	21
~~Beans – kale~~	~~A-B~~	~~18~~	~~Peas – kale~~	~~22~~
Maize flour – orange	B-C	5	Maize flour – plantain	5
Rice – cabbage	B-C	6	Rice – Irish potato	6
~~Kale – plantain~~	~~B-C~~	~~7~~	Millet flour – cabbage	7
~~Kale – cabbage~~	~~B-C~~	~~12~~	~~Kale – orange~~	~~8~~
Millet flour – orange	B-C	17	Millet flour – plantain	13
Maize flour – I. potato	B-C	19	~~Kale – Irish potato~~	~~14~~
Rice – plantain	B-C	20	Maize flour – cabbage	19
Millet fl. – I. potato	B-C	23	Rice – orange	20
Beans – Irish potato	A-C	8	Beans – plantain	9
Beans – orange	A-C	13	Peas – Irish potato	10
Peas – plantain	A-C	14	Beans – cabbage	15
Eggs – Irish potato	A-C	15	Peas – orange	16
Meat – cabbage	A-C	16	Eggs – plantain	17
Peas – cabbage	A-C	21	Meat – Irish potato	18
Eggs – orange	A-C	22	Eggs – cabbage	23
Meat – plantain	A-C	24	Meat – orange	24

* Order in which the items were presented

This report is one of a series by the Nutrition
Intervention Research Project; studies of child
nutrition programmes in Kenya, particularly in
Central Province. The aim of these reports is to
make some results of these studies quickly available;
the data are only partially analyzed and the
reports therefore preliminary.

This project is financed by the African Studies
Centre, Leiden, Netherlands and is based at the
Bureau of Educational Research, University of Nairobi.

Other reports:

1. Progress report, April 1977

2. Progress report, November 1977

3. A short dictionary of Kikuyu names of foods,
   meals and drinks, 1977

4. Report on the Family Life Training Centres,
   Bungoma, Busia, Kisumu, Kiambu and Murang'a; 1977

5. Revised Research Plan, February 1978

6. Progress report, July 1978

7. Classification of foods among the Kikuyu, 1978

8. Preferences of Kikuyu mothers for children's
   foods, 1978