Rural Areas Roads Project

Nutrition Status

of Children 1979-80

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Rural Access Roads Project

The rural access roads programme is an attempt to provide casual, short-term employment to improve access to markets for isolated rural populations. Although no explicit nutrition objective has been stated for the roads, improved marketing of agricultural surplus resulting from better access to population centers should in fact increase household income and food consumption.

The present analysis was carried out to test if rural access roads have affected the nutritional status, income, and/or consumption of the populations within the impact areas.

The Ministry of Transport and Communications undertook an evaluation of seven rural access roads in Western and Nyanza Provinces between January 1979 and March 1980. Enumerators collected monthly or quarterly data on a random sample of 828 households within the sphere of influence of the roads. Variables included road use, agricultural production, land use, and household income and expenditure. Anthropometric data on children was gathered on the same households in the period from January to March of both years.

Due to the limited area affected by each road, it would be inappropriate to apply provincial or "agro-ecological zone"-specific data from the Integrated Rural Surveys to these populations. Instead, reports of engineers, enumerators, and project staff have been relied on to interpret the evaluation surveys in determining the impact of the roads on the nutritional status of the population.

The roads span a wide variety of ecological zones, cropping patterns, levels of access to services and socioeconomic status (Tables 1 and 2).

In 1979, 687 children between the ages of 6 and 60 months were weighed and measured; in 1980 the same data were taken on 734 children from the same households. Of these, 192 children were present in both surveys and their data were analyzed by paired t-tests. For both groups, weight and height were compared with sex and age-specific W.H.O. standards (percent of median value, numbers below critical values, percentile, and z-score) and with Kenyan standards (percent expected value calculated from the 1978-79 national nutrition survey)[1]. All of the local stature data were collected as length using stadiometers or infantometers. For international comparisons, length was converted to height in children older than 24 months by the following equation:

$$\text{Height(cm)} = \text{Length(cm)} - (3\text{-}0.03846 \times \text{Age(mos)}.$$

For comparisons with local standards, length measurements only were used.

Results of cross-sectional and longitudinal comparisons of all roads together are shown in Tables 3 and 4, respectively. No significant differences were noted cross-sectionally. In the paired comparisons, however, performance relative to international standards significantly worsened from 1979 to 1980 in average weight-age centile, weight-age and weight-height percent median, and average weight-height z-score. When the expected growth deficit of normal Kenyan children was taken into account by using local standards, the length-for-age actually improved slightly (but statistically significantly) above what was expected. The differences noted here may not be physically significant. There was no observed difference in the proportion of children falling below the 10th centile or below 90 percent median height-age and weight-height.(Table 5)

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1. It had been found previously that Kenyan children grow more slowly than the reference population and as a result their relative performance worsens with increased age (this is not true of weight-for-height). Since the local growth pattern was virtually linear, the simple regression lines between age and weight and height were found to have high correlation coefficients. Hence by using local standards it was hoped that expectations of growth were adjusted to local conditions. The equations used were:

   Expected weight= 6.8086+0.16016xAge(mos);r=0.9898,df=2570
   Expected length=63.7730+0.7026xAge(mos); r=0.9872,df=2570

At the initial survey in 1979, Busia and Bungoma were the areas of the highest amount of chronic (HA) malnutrition (Table 1) and South Nyanza and Kisii had the most acute (WH) malnutrition (Table 2). Over the intervening year, children in Busia showed marked improvement in height and Kisumu showed clear deterioration in that variable. Kisii showed moderate gains in weight-for-height. By 1980, Kisumu and Kisii had become the areas of worst chronic malnutrition and Busia and Bungoma were worst in terms of weight-for-height.

While it matters little to which standards cross-sectional data are compared to detect changes in nutritional status (except that small increments will seem insignificant compared to the large deficit already present compared to international standards of anthropometric measures), however in evaluating longitudinal growth performance it is essential to use local data to determine whether an intervention has had any impact on the growth of children. As was shown here, the children seemed to have gotten worse over the year of study when international standards were used, but compared to their expected growth (i.e. that of rural Kenyan children) they have at least kept pace and perhaps made some marginal gains in height.

When the data were disaggregated by road, some cross-sectional data showed nutritional differences before and after the road was built. In Busia, a marked increase in height-age and length-age (local) was shown, coupled with a slightly lower relative weight-height (Table 6); this observation was also reflected in the proportions of children falling below the 10 centile (Tables 1 & 2) and 90 percent expected weight-height and height-age (Tables 7 & 6). In South Nyanza height (length) performance had deteriorated over the course of the year which resulted in a doubling of the proportion of children classified as stunted (less than 90 percent expected height-age). In Kisumu a similar trend appeared which resulted in nearly half of the children being stunted and over two-thirds of them fell below the 10th centile. Height-age is a more valuable indicator of longterm change in nutritional status than weight-height since the latter is rapidly altered by disease, food shortage, and seasonal poverty.

In Kisii, the height performance was unchanged over the year, but weight-height improved, possibly reflecting good harvests in 1979.

Waterlow tables (Table 9) indicate that the major problem is nutritional wasting (below 90 percent median weight-for-height) which affects over 70 percent of the children. South Nyanza and Kakamega had the largest proportion of wasted children. Kisii had the lowest proportion of wasted children but the highest of stunted children. Busia had the most stunted and wasted children. The only change in these road-specific distributions was found in 1980 compared to 1979, however stunted and stunted cum wasted children also increased about equally with the increased proportion of normal children.

That wasting was such a large problem in both surveys is difficult to interpret. Wasting is usually attributed to short-term food inadequacy. A wasted child who is refed would tend to move toward the normal quadrant but the stunted child who is refed would tend to gain length (perhaps without commensurate fat) and thus would travel toward the wasted or normal blocks. The stunted children who are not refed would become stunted and wasted but the wasted children who are not refed might move toward the stunted quadrant if their vertical growth slowed down in response to inadequate nutrition. Thus the direction of change in the block design may indicate the nature of the effect of the road on nutrition. By this analysis it would appear that Busia, Kakamega, Kisii, and Bungoma improved food consumption whereas Siaya, South Nyanza and Kisumu did not alter the deleterious nutrition pattern.

Table 1. Height-Age: Children under 10th Centile, International Standards

	Siaya	Busia	Kakamega	S. Nyanza	Kisumu	Kisii	Bungoma
Jan.-Mar. 1979	21/40 52.5%	103/148 69.6%	58/118 49.2%	35/111 31.5%	25/64 39.1%	29/66 43.9%	86/140 61.4%
Feb.-Mar. 1980	17/40 42.5%	56/124 45.2%	62/136 45.6%	38/89 42.7%	36/53 67.9%	65/105 61.9%	113/187 60.4%
Signif. of change		$p<0.001$			$p<0.01$	$p<0.05$	

Table 2 . Weight-Height: Children Under 10th Centile, International Stmdards

	Siaya	Busia	Kakamega	S. Nyanza	Kisumu	Kisii	Bungoma
Jan.-Mar. 1979	3/40 7.5%	20/148 13.5%	8/118 6.8%	25/111 22.5%	9/64 14.1%	17/66 25.8%	19/140 13.6%
Feb.-Mar. 1980	2/40 5%	26/124 21%	15/136 11%	12/89 13.5%	10/53 18.9%	13/105 12.4%	39/187 20.9%
Signif. of change						p<0.05	

Table 3. Cross - sectional data, rural access roads, Western and Nyanza Provinces Jan - March 1979 (X_1) and Feb to March 1980 (X_2) ($n_1 = 687$; $n_2 = 754$)

Variable	$\bar{X}_1 \pm$ S.D.	$\bar{X}_2 \pm$ S.D.	F-value (ANOVA)
Age (months)	32.3 ± 15.9	30.9 ± 15.5	3.05
Height-Age Centile	26.4 ± 30.5	24.4 ± 28.5	1.60
Height-Age Percent Median	95.0 ± 7.4	94.8 ± 6.6	0.50
Height-Age Z-Score	-1.3 ± 1.9	-1.3 ± 1.7	0.54
Weight-Age Centile	25.9 ± 25.8	25.2 ± 25.9	0.21
Weight-Age Percent Median	89.6 ± 13.6	89.1 ± 13.2	0.42
Weight-Age Z-Score	-1.0 ± 1.2	-1.0 ± 1.2	0.35
Weight-Height Centile	44.9 ± 28.3	44.6 ± 29.7	0.04
Weight-Height Percent Median	98.7 ± 10.9	98.7 ± 11.7	0.00
Weight-Height Z-Score	-0.2 ± 1.1	-0.2 ± 1.2	0.00
Weight-Age Percent Local Standards *	100.8 ± 15.2	100.2 ± 14.9	0.60
Length-Age percent Local Standards *	100.8 ± 7.8	100.5 ± 7.0	0.52

None of the F-values are significant at $p<0.5$

*Local standards calculated from regression lines of growth curves of 2570 rural Kenyan Children 6 - 60 months of age

Rural Access Roads Nutrition Data : Matched children 4 Aug 80

PROGRAM = T-TEST , DISK=RARWANG1

Table 4 Longitudinal Data, Rural Access Roads, Western and Nyanza Provinces, January - March 1979 (Round 1) and February - March 1980 (Round 2)

Variable	Mean Round 1	Mean Round 2	Paired t value	Degrees of freedom	Significance
AGE	24.48	37.31	144.186	192	**
HACENT	18.64	20.15	0.860	192	
HAPCMED	93.61	93.73	0.309	192	
HAZ	-1.53	-1.47	0.638	192	
WACENT	23.63	20.64	2.401	192	**
WAPCMED	88.75	87.38	1.790	192	*
WAZ	-1.03	-1.15	1.623	192	
WHCENT	46.72	42.74	1.707	192	*
WHPCMED	99.65	97.40	2.239	192	*
WHZ	-0.07	-0.32	2.345	192	**
WA local	99.98	99.13	1.049	192	
LA local	99.40	100.33	2.149	192	*

* p < 0.05
** p < 0.01

Local standards based on simple linear regression line drawn through National Nutriton Data from 78/79 survey
International standards computed using CDC Atlanta Subroutines adjusting measured length of children over 24 months to approximate stature

Table 5 Numbers of children 6-60 mos falling below critical values of anthropometric standards, Rural Access Roads.

	Weight-Age Centile /10th	Height-Age Centile /10th	Weight-Height Centile /10th	Weight-Age % Median /80%	Height-Age % Median /90%	Weight-Height % Median /90%	Weight-Age Z-Score /-2	Height-Age Z-Score /-2	Weight-Height Z-Score /-2
1979	289/687 42.1%	357/687 52.0%	101/687 14.7%	157/687 22.9%	156/687 22.7%	125/687 18.2%	122/687 17.8%	230/687 33.5%	33/687 4.8%
1980	322/734 43.9%	387/734 52.7%	117/734 15.9%	177/734 24.1%	166/734 22.6%	147/734 20%	146/734 19.9%	256/734 34.9%	49/734 6.7%

None of the differences are significant

Table 6. Growth performance of children 6060 months of age by rural access road, Jan.-Mar. 1979 and Feb.-Mar. 1980

		Siaya	Busia	Kakamega	S. Nyanza	Kisumu	Kisii	Bungoma.
Height-Age Percent Median	1979	94.0±5.7	92.9±6.6	95.4±5.1	98.0±6.9	96.8±7.4	95.8±11.8	93.8±7.1
	1980	96.4±7.8	96.0±6½8 ***	95.8±5.3	94.7±6.8 ***	92.0±7.7 ***	93.4±7.1	94.5±5.8
Weight-Age Percent Median	1979	90.4±10.9	86.7±12.5	91.8±10.0	92.3±14.8	90.8±15.1	90.9±18.4	87.2±12.9
	1980	96.4±14.3 *	88.8±13.1	92.1±11.6	89.0±12.9	87.8±14.5	90.4±14.1	85.3±12.2
Weight-Height percent median	1979	100.7±7.6	99.3±9.5	100.4±8.6	96.6±12.9	96.4±8.0	100.0±15.8	98.0±11.1
	1980	103.3±9.4	96.0±11½6 **	100.1±10.0	98.9±10.4	101.8±13.8 **	103.2±15.5	94.8±09.1 **
Weight-Age Percent Local Mean	1979	102.8±12.6	97.0±14.1	104.0±11.4	103.5±16.6	101.7±16.6	103.0±20.5	98.0±14.1
	1980	107.9±14.2	100.1±14.9	103.5±13.6	100.5±15.2	98.5±16.5	101.6±15.3	95.6±13.7
Length-Age Percent Local Mean	1979	100.0±5.8	98.2±6½8	101.6±5½4	103.8±7.2	102.2±7½6	102.1±12.7	99.4±7.4
	1980	101.8±7.7	102.0±6.9 ***	101.4±5.8	100.5±7.5 **	97.7±8.0 **	99.1±7.4	100.1±6.4

F values from ANOVA
*p/0.05
**p/0.01
***p/0.001

Table 7 . Children below 90 percent International Median Height-Age

	Siaya	Busia	Kakamega	S. Nyanza	Kisumu	Kisii	Bungoma
Jan.-Mar. 1979	9/40 22.5%	46/148 31.1%	15/118 12.7%	12/111 10.8%	14/64 21.9%	25/66 37.9%	35/140 25%
Feb.-Mar. 1980	12/40 30%	21/124 16.9%	11/136 8.1%	20/89 22.5%	25/53 47.2%	35/105 33.3%	42/187 22.5%
Signif. of change		p/0.05		p/0.05	p/0.01		

Table 8. Children below 90 percent international median weight-height

	%Siaya	Busia	Kakamega	S. Nyanza	Kisumu	Kisii	Bungoma
Jan.-Mar. 1979	3/40 7.5%	25/148 16.9%	11/118 9.3%	30/111 27%	12/64 18.8%	19/66 28.8%	25/140 17.9%
Feb.-Mar. 1980	2/40 5%	36/124 29%	18/136 13.2%	17/89 19.1%	10/53 18.9%	14/105 13.3%	50/187 26.7%
Signif. of change		$p<0.05$				$p<0.05$	

Table 9. Children 6-60 months, Rural Access Roads, 1979 and 1980, Waterlow Tables

	Siaya		Busia		Kakamega		S. Nyanza		Kisumu		Kisii		Bungoma		Overall	
	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979		1979	1980	1979	1980
Normal	0	6	12	9	8	15	7	6	1	7	4	8	8	6	40	57
Stunted	2	4	4	5	5	2	1	4	0	6	10	13	4	2	26	36
Wasted	31	22	90	92	95	110	92	63	49	21	37	62	97	139	491	511
Stunted and Wasted	7	8	42	16	10	9	11	16	14	19	15	22	31	40	130	130
	*		*						***							

*Chi-squared p/0.05
*** Chi-squared p/0.001

Stunted is /90% median weight-height
Wasted is /90% median height-age

Table 10. International Z-Scores Height-Age: Children below -2 Standard Deviations

	Siaya	Busia	Kakamega	S. Nyanza	Kisumu	Kisii	Bungoma
Jan.-Mar. 1979	16/40 40%	67/148 45.3%	27/118 22.9%	18/111 16.2%	18/64 28.1%	27/66 40.9%	57/140 40.7%
Feb.-Mar. 1980	14/40 35.0%	36/124 29%	33/136 24.3%	30/89 33.7%	29/53 54.7%	53/105 50.5%	61/187 32.6%
Signif.. of change		p/0.01		p/0.01	p/0.01		

Table 11. International Z-Scores, Weight-Age: Children below -2 Standard Deviations

	Siaya	Busia	Kakamega	S. Nyanza	Kisumu	Kisii	Bungoma
Jan.-Mar. 1979	6/40 15%	37/148 25%	10/118 8.5%	10/111 9%	16/64 25%	15/66 22.7%	28/140 20%
Feb.-Mar. 1980	1/40 2.5%	30/124 24.2%	11/136 8.1%	20/89 22.5%	11/53 20.8%	17/105 16.2%	56/187 29.9%
Signif. of change	$p < 0.05$			$p < 0.01$			$p < 0.05$

Table 12 . International Z-Scores, Weight-Height: Children below -2 Standard Deviations

	Siaya	Busia	Kakamega	S. Nyanza	Kisumu	Kisii	Bungoma
Jan.-Mar. 1979	0/40 0%	6/148 4.1%	2/118 1.7%	9/111 8.1%	4/64 6.3%	9/66 13.6%	3/140 2.1%
Feb.-Mar. 1980	1/40 2.5%	17/124 13.7%	2/136 1.5%	2/89 2.2%	5/53 9.4%	4/105 3.8%	18/187 9.6%
Significance of change		p/0.01				p/0.05	p/0.01

Table 13. Children below 80 percent International Median Weight-Age

	Siaya	Busia	Kakamega	S. Nyanza	Kisumu	Kisii	Bungoma
Jan.-Mar. 1979	6/40 15%	46/148 31.1%	16/118 13.6%	15/111 13.5%	18/64 28.1%	16/66 24.2%	40/140 28.6%
Feb.-Mar. 1980	4/40 10%	36/124 29%	15/136 11%	23/89 25.8%	13/53 24.5%	21/105 20%	65/187 34.8%
Signif. of change				p<0.05			

Table 14 . Weight-Age: Children Under 10th Centile, International Standards

	Siaya	Busia	Kakamega	S. Nyanza	Kismum	Kisii	Bungoma
Jan.-Mar. 1979	12/40 30%	79/148 53.4%	34/118 28.8%	38/111 34.2%	26/64 40.6%	27/66 40.9%	73/140 52.1%
Feb.-Mar. 1980	11/40 27.5%	55/124 44.4%	39/136 28.7%	41/89 46.1%	26/53 49.1%	46/105 43.8%	104/187 55.6%

None of the changes were significant

Appendix II

Tables prepared for Analysis of

Nutrition and Socio-economic Variables.

All Roads

Per Capita Milk Production - Kg/year

	0	Under 15	15-30	30-60	Over 60
No.of Households	232	44	46	51	37
No.of Children	376	80	98	93	68
No.of Stunted children	176	42	40	33	19
%	(46.8%)	(52.5%)	(40.8%)	(35.5%)	(27.9%)
No.of Wasted Children	64	10	23	11	5
%	(17.0%)	(12.5%)	(23.5%)	(11.8)	(7.4%)
No.of Sick Children	210	39	50	47	37
%	(55.8%)	(48.8%)	(51.0%)	(50.5%)	(54.4%)
Total Cattle					
0	134	4	3	4	5
	(57.8%)	(9.1%)	(6.5%)	(7.8%)	(13.5%)
1-4	61	16	12	13	11
%	(26.3%)	(36.4%)	(26.1%)	(25.5%)	(29.7%)
5+	37	24	31	34	21
	(15.9%)	(54.5%)	(67.4%)	(66.7%)	(56.8%)
No.of Traditional buildings					
0	30	2	3	5	3
	(12.9%)	(4.5%)	(6.5%)	(9.8%)	(8.1%)
1	95	11	6	5	7
	(40.9%)	(25%)	(13%)	(9.8%)	(18.9%)
2	59	7	15	14	8
	(25.4))	(15.9%)	(32.6%)	(27.5%)	(21.6%)
3 or more	48	24	22	27	19
	(20.7%)	(54.5%)	(47.8%)	(52.9%)	(51.4%)

All Roads Value of Inputs on Farm, KShs/Year	0	Under 50	50 - 100	100-200	Over 200
No.of households	215	70	30	45	41
No.of children	352	110	55	80	82
No.of stunted children %	169 (48%)	51 (46.4%)	25 (45.4%)	29 (36.2%)	29 (35.4%)
No.of wasted children %	64 (18.2%)	18 (16.4%)	10 (18.2%)	9 (11.2%)	8 (9.8%)
No.of sick children %	214 (60.8%)	74 (67.3%)	26 (47.3%)	46 (57.5%)	36 (43.9%)
Total Cattle					
0	118 (54.9%)	12 (17.1%)	3 (10%)	6 (13.3%)	9 (22%)
1-4	49 (22.8%)	36 (51.4%)	5 (16.7%)	9 (20%)	12 (29.3%)
5+	48 (22.3%)	22 (31.4%)	22 (73.3%)	30 (66.7%)	20 (48.8%)
No.of Traditional Buildings					
0	30 (14.0%)	3 (4.3%)	3 (10%)	3 (6.7%)	4 (9.8%)
1	79 (36.7%)	23 (32.9%)	2 (6.7%)	6 (13.3%)	12 (29.3%)
2	48 (22.3%)	20 (28.6%)	9 (30%)	13 (28.9%)	10 (24.4%)
3 or more	58 (27.0%)	24 (34.3%)	16 (53.3%)	23 (51.1%)	15 (36.6%)

All Roads				
Cropping Area - ha	0	(0-.2)	(.2-4)	(.4-2)
No.of households	49	86	71	204
No.of children	82	159	114	370
No.of stunted children %	40 (48.8%)	84 (52.8%)	53 (46.5%)	133 (35.9%)
No.of wasted children %	23 (28.0%)	24 (15.1%)	13 (11.4%)	53 (14.3%)
No.of sick children	43 (52.4%)	68 (42.8%)	82 (71.9%)	217 (58.6%)
Total Cattle				
0	37 (75.5%)	38 (44.2%)	28 (39.4%)	47 (23%)
1-4	7 (14.3%)	19 (22.1%)	26 (36.6%)	61 (29.9%)
5+	5 (10.2%)	29 (33.7%)	17 (23.9%)	96 (47.1%)
No.Traditional Buildings				
0	21 (42.9%)	6 (7%)	4 (5.6%)	12 (5.9%)
1	13 (26.5%)	36 (41.9%)	32 (45.1%)	43 (21.1%)
2	7 (14.3%)	15 (17.4%)	20 (28.2%)	61 (29.9%)
3 or more	8 (16.3%)	29 (33.7%)	15 (21.1%)	88 (23.8%)

All Roads

No.of Crops planted by Farmer	1-2	3-5	6-7	8+
No.of households	64	112	74	157
No.of children	116	194	134	266
No.of stunted %	60 (51.7%)	93 (47.9%)	52 (38.8%)	103 (38.7%)
No.of wasted %	24 (20.7%)	30 (15.5%)	15 (11.2%)	43 (16.2%)
No.of sick %	73 (62.9%)	107 (55.2%)	79 (59.0%)	146 (54.9%)
Total Cattle				
0	28 (43.8%)	41 (36.6%)	28 (37.8%)	50 (31.8%)
1-4	17 (26.6%)	35 (31.3%)	20 (27.0%)	41 (26.1%)
5+	19 (29.7%)	36 (32.1%)	26 (35.1%)	66 (42.0%)
No.traditional buildings				
0	11 (17.2%)	9 (8.0%)	4 (5.4%)	18 (11.5%)
1	26 (40.6%)	38 (33.9%)	24 (32.4%)	35 (22.3%)
2	12 (18.8%)	30 (26.8%)	18 (24.3%)	42 (26.8%)
3 or more	15 (23.4%)	35 (31.2%)	28 (37.8%)	62 (39.5%)

All Roads

Distance from Road, Km

	0	1-2	3-7	8-14	15+	Total
No of households	45	79	87	90	109	410
No.of children	75	145	150	150	195	715
No.of stunted	37 (49.3%)	66 (45.5)	62 (41.3%)	67 (44.7%)	78 (40%)	
No.of wasted %	14 (18.7%)	22 (15.2%)	23 (15.3%)	29 (19.3%)	25 (12.8%)	
No.of sick	41 (54.7%)	88 (60.7%)	81 (54%)	88 (58.7%)	112 (57.4%)	
Total Cattle						
0	17 (37.8%)	32 (40.5%)	44 (50.6%)	26 (28.9%)	31 (28.4%)	
1 - 4	13 (28.9%)	22 (27.8%)	16 (18.4%)	28 (31.1%)	34 (31.2%)	
5+	15 (33.3%)	25 (31.6%)	27 (31.0%)	36 (40.0%)	44 (40.4%)	
No.Traditional Buildings						
0	3 (6.7%)	14 (17.7%)	9 (10.3%)	7 (7.8%)	10 (9.2%)	
1	16 (35.6%)	19 (24.1%)	33 (37.9%)	25 (27.8%)	31 (28.4%)	
2	9 (20.0%)	19 (24.1%)	19 (21.8%)	25 (27.8%)	31 (28.4%)	
3 or more	17 (37.8%)	27 (34.2%)	26 (29.9%)	33 (36.7%)	37 (33.9%)	

All Roads

Per Capital Land Holding - Ha

	0-0.25	.25-5	.5-.75	.75-1	1
No.of Households	175	115	57	24	31
No.of Children	351	199	95	48	53
No.of Stunted Children	148 (42.2%)	74 (37.2%)	44 (46.3%)	16 (33.3%)	23 (43.4%)
No.of Wasted Children	49 (14.0%)	34 (17.1%)	9 (9.5%)	7 (14.6%)	12 (22.6%)
No.of Sick Children	176 (50.1%)	111 (55.8%)	52 (54.7%)	32 (66.7%)	34 (64.2%)
Total Cattle					
0	76 (43.4%)	35 (30.4%)	13 (22.8%)	7 (29.2%)	11 (35.5%)
1-4	50 (28.6%)	31 (27%)	16 (28.1%)	6 (25%)	10 (32.3%)
5+	49 (28%)	49 (42.6%)	28 (49.1%)	11 (45.8%)	10 (32.3%)
No.of Traditional Buildings					
0	14 (8%)	12 (10.4%)	5 (8.8%)	0	4 (12.9%)
1	64 (36.6%)	27 (23.5%)	14 (24.6%)	7 (29.2%)	12 (38.7%)
2	45 (25.7%)	34 (29.6%)	15 (26.3%)	6 (25%)	3 (9.7%)
3 or more	52 (29.7%)	42 (36.5%)	23 (40.4%)	11 (45.8%)	12 (38.7%)

All Roads

Income - KShs/year(Farm sales + primary off-farm income)

	0 or less	2200	2000-6400	6400
No.of Households	262	39	52	57
No.of children	460	67	85	103
No.of stunted children %	215 (46.7%)	27 (40.3%)	30 (35.3%)	38 (36.9%)
No.of wasted children %	79 (17.2%)	9 (13.4%)	12 (14.1%)	13 (12.6%)
No.of sick children %	266 (57.8%)	40 (59.7%)	55 (64.7%)	49 (47.6%)
Total Cattle				
0	99 (37.8%)	13 (33.3%)	24 (46.0%)	14 (24.6%)
1 - 4	67 (25.6%)	16 (41.0%)	12 (23.1%)	18 (31.6%)
5+	96 (36.6%)	10 (25.6%)	16 (30.8%)	25 (43.9%)
No.of Traditional Buildings				
0	25 (9.5%)	5 (12.8%)	5 (9.6%)	8 (14.0%)
1	81 (30.9%)	10 (25.6%)	20 (38.5%)	13 (22.8%)
2	66 (25.2%)	9 (23.1%)	15 (28.8%)	13 (22.8%)
3 or more	90 (34.4%)	15 (38.5%)	12 (23.1%)	23 (40.4%)

Roads - 4,6,8,9,13	4	6	7	9	13
No.of Households	68	72	53	68	86
No.of children	117	136	86	104	179
No.of Stunted Children %	42 (35.9%)	45 (33.1%)	30 (34.9%)	60 (57.7%)	80 (44.7%)
No.of Wasted Children %	26 (22.2%)	15 (11.0%)	10 (11.6%)	13 (12.5%)	37 (20.7%)
No.of Sick Children %	74 (63.2%)	81 (59.6%)	61 (70.9%)	65 (62.5%)	72 (40.2%)
Total Cattle					
0	32 (47.1%)	8 (11.1%)	10 (18.9%)	25 (36.8%)	40 (46.5%)
1-4	10 (14.7%)	20 (27.8%)	23 (43.4%)	31 (45.6%)	12 (14.0%)
5+	26 (38.2%)	44 (61.1%)	20 (37.7%)	12 (17.6%)	34 (39.5%)
No.of Traditional Buildings					
0	4 (5.9%)	3 (4.2%)	5 (9.4%)	8 (11.8%)	6 (7.0%)
1	10 (14.7%)	7 (9.7%)	16 (30.2%)	33 (48.5%)	26 (30.2%)
2	17 (25.0%)	23 (31.9%)	15 (28.3%)	16 (23.5%)	24 (27.9%)
3 or more	37	39	17	11	30

APPENDIX III - JOBS SUBMITTED

1) Rural Roads Master File Updates
23

2) Reformat Program Changes
20

3) Data Dictionary Changes
4

4) Rural Roads Master File Validation
10

5) Rural Roads Lists for consistency checks
9

6) Tabulation Program Run
38

7) Program to create extract file for Rural Roads Nutrition
11

8) Program to extract nutrition data to diskette
5

9) Initial Nutrition Tables from Round 2
5

10) SPSS program to read extract nutrition file
9

11) Tabulation for rate of return
3

12) Program to create Rural Roads Labour file
7

13) SPSS program to analyse Rural Roads Labour file
11

14) Program to update Source Statement Library
6

15) Rural Roads Time Series file creation program
14

16) Program to remove and replace nutrition data
13

17) Create list of expenditure data for McGuire
1

18) IRS 4 extract file program
16

19) Tabulation program for extracted IRS 4 files
5

20) List of livestock and crop production from IRS -4
6

21) Creation and execution of program to merge 12 labour force files

22

22) Miscellaneous

98

TOTAL RUNS SUBMITTED 336

Appendix IV

Note on Revision of Rural Roads Impact Evaluation Study.

Mr. How

RURAL ACCESS ROADS IMPACT EVALUATION STUDY.

PROPOSALS FOR REVISION AND EXPANSION OF THE STUDY.

BACKGROUND:

The Rural Access Roads Impact Evaluation Study is a project jointly run by the CBS and the Ministry of Transport and Communications (Roads Branch). The main objective of the study is to evaluate the benefits (in both economic and social terms) that accrue to householders immediately adjacent to the roads. In addition the study also aims at identifying certain major indicators and key variables that could be used to determine future construction criteria for such roads. In order to fullfil the above objectives of the study various statistical questionnaires have been administered on selected households within the impact areas of these roads. In addition two methods of data collection (i.e. monthly and quarterly) have been used throughout the last one year that the survey has been conducted in the field.

After various statistical tests, conducted to determine the validity of both methods of data collection (i.e monthly and quarterly) it has been decided to drop the quarterly recall period in favour of the monthly and to increase the number of households being covered monthly accordingly. Specifically the number of households covered by each enumerator monthly has been increased from 30 to 60. This is a temporary measure as will be seen in the following paragraphs.

NEED FOR REVISION.

The need to revise the current impact study design has been felt and expressed in various forums and particularly in the monthly working group meetings that review progress with regard to the study. The need to have the study design revised has been felt mainly because:-

1) There are not enough funds to expand the current study to many more roads as had been stipulated previously.

2) It is felt that the current study design is too complex and a large amount of data is generated which may not all meet the needs of the study.

3) The advent of National Sample Survey and Evaluation Programme (NASSEP) as a major CBS field survey undertaking has highlighted the need to incorporate the impact study within this programme without any loss of objective and substance of the study.

In addition to the above, the Bureau itself has lately received several requests for impact evaluation of one type or another and it is felt that this is now an opportune time to harmonise these various requests.

PROPOSALS:

1. It is now proposed that new access roads to be covered in the study will be selected from among those roads that are very close to or within CBS NASSEP Clusters. This will ensure that there is no duplication in our efforts and that enumerator visiting households in the study areas may very well assist with NASSEP work or vice versa.

/2..

2. Work currently going on the 7 roads in Nyanza and Western provinces should continue uninterrupted but for new additional roads a baseline survey only be conducted to be supplemented in between the year by modules and other socio anthropological surveys and selected case studies.

3. New districts covered by the expanded programme will be stratified according to:

a) Whether there are rural access roads within or close to the MASSEP CLUSTERS

b) Whether there are roads other than access roads i.e. whether there are classified, or other roads within or close to the clusters.

c) Whether there are no roads at all within or close to these clusters.

The main objective of this type of stratification is to provide some control so that data obtained from impact study areas may be compared with those from non-study areas

4. Questionnaires currently used in the 7 roads on cyclical work should be revised and shortened drastically to bring them not only more in line with the objectives of the study but also to ensure that the data obtained therefrom are processed and analysed more timely. This will also make it possible for the enumerators to cover more households and to make themselves (for other surveys Available such as traffic census conducted by MOTC

5. An analysis of data so far collected will be made with a view to determining the frequency of certain information and their relevance to the study. This is especially in view of 4) above.

CONCLUSION:

It should be emphasised that the above proposals in no way diminish the urgency of the budget proposals earlier on presented to MOTC and donors. On the contrary, the success of the proposals depends entirely on how soon funds are made available to the CBS and especially for equipment and vehicles.

The CBS is willing to accept comments on the above proposals with a view to improving on them. This is particularly necessary with the new questionnaires.

(S. O [illegible])
C.B.S

9th September, 1980.

Appendix V

Decription of Time Series Data File for Rural Roads

TIME SERIES DATA FILE FOR RURAL ROADS

I. Objectives

a) Create a data file containing quarterly aggregations of cyclical data.

b) Retain round 1 and round 2 distinctions for non-cyclical data.

c) Relate the quarterly period to an actual calendar date.

d) Analyse changes over time as well as differences between round 1 and round 2.

e) Collapse crop and expenditure codes to most significant groupings.

II. Summary of data for the output file:

1. Record 00

- Road Number
- Strata
- House Number
- Sample Period

2. Record 01 (Round 1, Round 2)

- Sex of household head
- No. of males
- No. of females
- Age groups (8)
  - 0-5,5-9,10-14,15-19,20-29,30-39,40-49,50+
- No. under 15
- No. over 60
- No. under 15 in school
- Education of head
- Highest grade attained
- No.of wives
- No. of daughters
- No. of sons
- Occupation of head
- No.of non-farm occupations

3. Record 07 (Round 1, Round 2)

- Holding area
- Type of tenure
- Number of parcels
- Total cropping area
- Cropping area as percent of holding
- Cropping area by crop code (12)

4. Record 11 (Round 1, Round 2)

- No.of respondents
- Average weight for age
- Average Length for age
- Average weight for length

5. Record 12
   - Source of water wet and dry seasons
   - Distance to water wet and dry seasons
   - Sewage disposal method

6. Record 20 (Round 1, Round 2)
   - Improved cattle
   - Unimproved cattle
   - Sheep
   - Goats
   - Chickens

7. Record 21 (Round 1, Round 2)
   - Permanent Buildings
   - Traditional Buildings
   - All other structures
   - Lamps
   - Radios
   - Bicycles

8. Record 31 - non-farm employment
   - non-farm income total
   - main non-farm income
   - secondary non-farm income
   - total costs
   - cycle reporting

9. Record 32 - Financial transactions
   - Loans given
   - Loans received
   - Remittances given
   - Remittances received
   - Month of maximum transaction

10. Record 40

- Changes in plots total
- Changes in plots by crop (12)
- Maximum added, changes from metres to hectares
- Maximum month since last cultivated
- Month of maximum change

11. Record 41 - Crop Inputs

- divide into fertilizer, fungicide,machinery,livestock feed, wages
- value and kilos for fertiliser
- Value only for all others

12. Record 42 - Harvest Disposal

- Crop balance by crop code (12)
- Harvest by crop code (12)
- Purchase by crop code (12)
- Sales (kilos) "
- Sales (shillings) "
- Consumption "
- Quarter of maximum consumption

13. Record 43,44,45,46,47 Livestock Changes

- Sales (numbers)
- Sales (shillings)
- Consumed
- Number at last visit - number now
- Born
- Purchased (number)
- Purchased (shillings)
- Given (numbers)

14. Milk production - Record 47
    - Sales (shillings)
    - Sales (kilos)
    - Consumption (kilos)
    - Disposal (kilos)
    - Total production (kilos)

15. Record 50 - Road use
    - Type of road
    - Trip purpose x frequency
    - Mode of transport x frequency
    - Distance from holding to road
    - Time taken divided by distance by purpose
    - Time taken - mode of transport
    - Trip cost divided by distance by mode

16. Record 60 - Regular expenditures
    - Value of group codes
    - Value by number of purchases
    - Source of expenditure by value

17. Record 61 - Major expenditures
    - Value by codes

III. Pseudo-code

OPEN input and output files
Define input as an FPS variable occurs depending on file
Define output file as a fixed length record file
Define input record types in working storage
Build output record in working storage; write output record FROM working storage definition

PERFORM a crop indexing routine to record significant crops
PERFORM a quarterly aggregation procedure for each cyclical data item.

PERFORM a round 1 and round 2 summary with an occurs definition.

LOOK UP correct calendar date from table depending on sample period.

Appendix VI

Reports on Anomalies Between First and Second Baseline Population for Rural Roads.

CBS 107/03/01.

Mr. John Kekovole.

c.c. P. Singh.

" S. Akach.

" B. Karina.

" A. Kudat

RE: ANOMALIES BETWEEN ROUND 1 AND ROUND 2 POPULATIONS FOR RURAL ROADS

Population differences between round 1 and round 2 surveys of rural roads are severe. The following table lists the number of households and the number of persons reporting in round 1 and round 2. These differences make the quality of the data on population unacceptable as it currently exists on the data tape.

Please, can the following steps be taken :

- review the listing of round 1, round 2 persons prepared in September. I shall rerun it this week.
- examine the schedule for those cases showing great differences.
- return to the field where anomalies still exist, not explained by the schedule.
- re-enter the data for the appropriate cases.

...../2.

UNWEIGHTED POPULATION DIFFERENCES ROUND 1, ROUND 2

	HOUSEHOLDS	PERSONS	HOUSEHOLDS	PERSONS	HOUSEHOLDS	PERSONS
Road 1	118	462	109	411	- 9	-51
Road 4	119	966	113	748	- 6	-218
Road 6	106	836	105	765	- 1	-71
Road 7	115	830	111	642	- 4	-188
Road 8	116	494	96	444	-20	-50
Road 9	116	583	114	638	- 2	+55
Road 13	116	819	111	927	- 5	+108

H.J. Herr.

21st October, 1980.

HJH/sny.

CBS. 127/03/01

Mr. John Kekovole

c.c. Mr. H.J. Herr ✓
Mr. Akach

RE: ANOMALIES BETWEEN FIRST AND SECOND BASELINE POPULATION FOR RURAL ROADS

Inconnection to Mr. Herr's letter dated 21st October 1980, attached find the household case report for Roads - Kisumu (08), Kakamega (06), Bungoma (13) and Siaya (01).

It is only these roads that the exercise has been completed.

Reference to the table contained in the above letter a similar exercise need to be conducted for Road (04) - Busia with a difference of - 218, and Road 07 - South Nyanza with a difference of - 183.

I hope the attached report will help to explain why such differences occured.

E.A. Okeyo

24th October, 1980

EAO/mw.

BUKOMA - ROAD 13.

179 - Son to head got married and the wife delivered, also children who were away during first baseline are now at home.

191 - separeted due to demestic dispute. Wife went away with the children.

192. - Daughter to head divoced and joined her parents with her children

166 - Father to Machael died and the monther with the rest of the family are under care of Machael bat they donot constitute one household - they were wrongly listed as member of the same household.

089 - grand children augmented the household size. These are children of a son who works in Mombasa and they are now staying at home. Also two other relatives from Uganda joined as members.

084 - Father to Bern Psiret died. The enumerator included Mother, Sisters and brothers to Bern as members of the household.

309 - Had a wife and children during first baseline and separeted during second baseline. Wife went away with the children.

119 - One wife encountred during second baseline. There were two wives during second baseline.

281 - Joseph Juma was joined by his brother Siverster Juma who is married. They were included as member of the household of Mr. Joseph Juma - wrongly included.

051 - Grandmother and her children joined Jackson but they donot eat together. But since they reside in the compound of Jackson, they were mistakenly listed as members of the household.

078 - Wangila a son to Shaban Shimiyu joined the father during second baseline. He is married with children.

106 - Gabrief Wefula was listed a lone during first baseline. During second base nieces, newphews, father and monther were included as members.

Gabriel sometimes cooks by himself and sometimes eats fat mothers - diffiqvity in drawing conclution whether they fonform one household or not.

/2..

277 - Two wives of Bekoton were met during first baseline. During second baseline a son who was away joined and included together with his children.

Also a son who was in the first baseline got married during the survey period. The co-wife doesnot qualify to be amember of the household and her children.

238 - Nabei bought a piece of land a distance from the holding. The son who was staying with them moved to settle in that piece of land, together with his family leaving father and mother.

133 - Ngeywa Chemutai was joined by the wife and her son who is married children.

They were settle on another piece of land during first baseline.

KAKAMEGA - ROAD 06

045 - One member died, a worker went away,
One daughter got married and other relative went away. Kwoma - the former head, stays away from home.

072 - During first baseline, the son's family was wrongly included. Also included school children in boarding schools. The son has his own home doesnot share the compound with the parents.

009 - Included were five (5) workers and one other relative (niece) during the second baseline. They were not there during the first baseline.

067 - During first baseline Muhuyi a son to Mwaka was wrongly included together with his family. His family has eight (8) member hence the drop.

079 - First baseline included two sons who are married and their families. Second baseline excluded them.

089 - An in-law married staying in the same compound was wrongly included during first baseline.

094 - 102

- H/H 102 is married to a daughter of H/H 094. During first base line, this particular wife and her children were counted under father's household. During second baseline they were counted under Household 102. H/H 102 has two wives.

008 - Lichisoyi and Luke son's to Masoni were mistakenly included in the first baseline. They are married. All children to Mason included during first baseline.

032 - During first baseline a son and his family of four (4) were included. Also there at that time was mother in-law. During second baseline former head was away.

017 - Son's wife Phemena Risa wrongly included during first baseline. She has two children. Also not included are Gascon and Beatrice.

023 - Yakobo and Seiaya were omitted during second baseline.
During first baseline Geofred Mbogo and his family of four (4) mistakenly included. They constitute a separate household.

021 - Rebecca first wife and her five (5) children were not listed as members of the household during first baseline.

003 - Son's wives and their children not included during second baseline. The three wives to Paul Lunani are staying in their own homes and donot constitute or be listed as one household. Though they were all included.

KISUMU - ROAD 09

019 - Some of the children movedto to help a grandmother whose leg got broke - 018/Q2.

093 - Divorced his wife.

106 - Widowed.

124. - Divorced one of the wives, two children joined secondary school.

151 - Paul Ayemba moved to Mumias for employment. He was accompanied by the wife.

161 - A daughter who is separated joined the household with her children. The Other relative who is schooling also joined.

165 - Adongo married a second wife who gave birth. The first wife also gave birth to twins.

183 - Mr. Olulo who is a teacher was listed alone with his wife during first baseline. In the second baseline his parents with whom they share meals were also included.

174 - Flora has been away at Muhoroni. NB: Flora is a wife to Zablon Okelo 176/Q3 A check should be made on what happened during listing period.

014 - Joined the husband.

060 - Otieno went in search for employment and the wife joined the parentsof Mr. Otieno.

064 - Siprosa had joined the husband during second baseline thus vacant.

162 - First baseline included two Independant wives. The second baseline only listed the first wife.

061 - Some children moved to secondary school outside the impact area. Some children joined their father at Busia.

065 - Joined by a daughter having a child. Also included is a wife to a son who is away.

031 - Was staying with a wife to a son who had one child. The wife has divorced the son and went away with the child.

016 - A son to the respondent was on leave during second baseline. He was included together with his family as members of the household.

121 - During the first baseline Mr. Otieno was listed alone. His parents with whom they were sharing meals were not included. During second baseline the parents were included, also Otieno got married during the course of the survey.

...../2

094 - During second baseline the first wife and some of her children were away.

005 - During first baseline, the respondent was staying with some grandchildren, who had left by the time the second baseline was being conducted.

146 - During second baseline Mr. Onyango the respondent, had gone to Limuru where he is currently working. With him there are first wife and two children.

SIAYA - ROAD 01

355 - Mother who was together with the son in the first baseline was wrongly ommited during second basline. Also not included are brothers and sisters to the head.

301 - Two children born during the survey period. Also included is a wife to the son.

309 - Two daughters got married. Wife to Son separated, she had a baby.

065 - Son to head and his family omitted during second baseline.

271 - A wife and two children moved outside home area

195 - Old Mother - not very normal mentally. During first baseline one worker and a child to the worker were omitted. During second baseline one worker was also not included.

141 - Husband died during the survey period. The first wife replaced the former head. She has one child staying with her now. Other co-wives not included during second baseline. did they move away

190 - Son who is a teacher moved on transfer together with his family. So during the second baseline, they were not included resulting in less members.

332 - Two children moved to Kisumu - schooling.

353 - One daughter got married during the survey period, and another one Patricia was staying outside the impact area. She has a child and both were counted as members during the first baseline and not in second baseline.

ROAD 01

SIAYA DISTRICT

HOUSEHOLD NO.	TOTAL MEMBERS		DIFFERENCE	REMARKS
	FIRST BASELINE	SECOND BASELINE		
033	7	10	3	
065	6	2	4	
151	4	1	3	
141	8	2	6	
180	7	4	3	
195	1*	3	2	
201	1*	3	2	
227	9	6	3	
271	12	8	4	
309	8	4	4	
323	3	6	3	
327	6	3	3	
353	4	1	3	
355	8	3	5	

ROAD NO. 4 BUSIA DISTRICT

HOUSEHOLD NO.	TOTAL MEMBERS		DIFFERENCE	REMARKS
	1ST. BASELINE	2ND. BASELINE		
002	-	8		
016	15	5	10	
020	10	7	3	
028	8	3	5	
052	6	2	4	
057	8	3	5	
062	22	16	6	
068	8	3	5	
072	14	9	5	
076	14	7	7	
078	13	2	11	
085	7	4	3	
087	11	8	3	
094	11	7	4	
108	12	6	6	
112	14	11	3	
119	18	15	3	
122	11	2	9	
128	15	2	13	
134	10	6	4	
140	8	14	6	
143	21	9	12	
149	13	17	4	
150	8	3	5	
181	8	5	3	
197	10	7	3	
215	13	2	11	
217	10	5	5	
222	16	10	6	
232	-	8	-	
233	8	5	3	
238	9	6	3	
344	16	12	4	
354	9	3	6	
366	8	3	5	

ROAD 6 KAKAMEGA DISTRICT

HOUSEHOLD NO.	TOTAL MEMBERS		DIFFERENCE	REMARKS
	1ST BASELINE	2ND. BASELINE		
003	23	14	9	
008	21	16	5	
009	6	13	7	
010	vacant	2		
017	6	2	4	
021	4	10	6	
023	13	7	6	
032	11	5	6	
035	14	19	5	
042	12	6	6	
045	9	3	6	
047	5	vacant		
063	9	6	3	
065	18	14	4	
067	14	5	9	
071	9	6	3	
072	15	4	11	
070	11	8	3	
079	14	7	7	
086	5	8	3	
087	vacant	4		
088	12	6	6	
084	-	5	-	
094	8	5	3	
102	6	10	4	

ROAD 07 SOUTH NYANZA

HOUSEHOLD NO.	TOTAL MEMBERS		DIFFERENCE	REMARKS
	FIRST BASELINE	SECOND BASELINE		
015	1	5	4	
024	10	3	7	
030	10	13	3	
059	5	13	8	
051	10	3	7	
057	7	1	6	
061	7	3	4	
064	1	4	3	
071	21	4	17	
072	1	3	2	
077	6	3	3	
079	9	4	5	
081	12	9	3	
097	14	7	7	Including children in boarding schools
113	10	6	4	
122	-	6		*
125	7	4	3	
153	15	10	5	
159	3	8	5	
162	7	4	3	
184	-	3		*
196	-	6		
205	9	6	3	
225	5	2	3	
240	10	4	6	
256	6	9	3	
257	9	4	5	
258	17	8	9	
261	3	1	2	
274	11	3	8	
276	6	1	5	
277	14	7	7	
281	10	4	6	
284	25	-		*
202	16	6	10	

ROAD 8 KIGUMU DISTRICT

HOUSEHOLD NO.	TOTAL NUMBERS FIRST BASELINE	SECOND BASELINE	DIFFERENCE	REMARKS
002	2	6	4	
005	8	5	3	
014	3	Vaccant		*
016	4	8	4	
013	6	vaccant		
018	1	4	3	
022	5	1	4	Different H/Hold.
019	6	2	4	
031	3	1	2	
037	vaccant	vaccant		*
051	4	vaccant		*
052	vaccant	3		*
055	missing	4		*
061	11	4	7	
064	2	vaccant		*
060	3	vaccant		*
073	4	vaccant		*
074	10	7	3	
078	9	4	5	
093	3	1	2	
094	9	5	4	
097	2	8	6	
106	missing	1		*
109	6	vaccant		*
114	5	8	3	
121	1	7	6	different H/Hold
123	1	vaccant		*
126	2	6	4	
124	10	7	3	
139	6	vaccant		*
146	6	2	4	
065	1	4	3	
142	6	3	3	
151	2	vaccant		*
162	8	4	4	
161	3	9	6	
165	5	8	3	
183	2	9	7	
174	6	vaccant		*

ROAD 9

KIŠII DISTRICT

HOUSEHOLD NO.	TOTAL MEMBERS		DIFFERENCE	REMARKS
	FIRST BASELINE	SECOND BASELINE		
003	6	2	4	
006	1	7	6	
015	1	5	4	
021	12	7	5	
025	13	9	4	
026	1	12	11	
023	9	6	3	different household
030	1	4	3	
034	4	7	3	
036	* 7	0*	7	vacant
048	1	6	5	
049	9	6	3	
058	6	10	4	
064	2	7	5	
066	8	4	4	
081	17	20	3	
088	7	3	4	
090	2	13	11	
098	1	6	5	
110	* -	9		missing
121	1	4	3	
135	10	6	4	
032	6	3	3	
144	3	6	3	
162	9	4	5	
175	15	8	7	
203	2	8		
224	7	3	4	
236	1	5	4	
244	4	1	3	
074	1	1		different household

R[illegible] 15 — B[illegible]

H/HOLD NO.	TOTAL NUMBER		DIFFERENCE	REMARKS
	First Baseline	Second Baseline		
051	5	11	6	
072	15	12	3	
078	4	9	5	
084	6	11	5	different H/Hold.
089	5	9	4	
091	-	9		
106	1	7	6	
110	3	6	3	
119	4	8	4	
125	11	14	3	
129	9	6	3	
133	1	7	6	
139	2	4		
161		4		
167		8		
166	4	16	12	Different H/Hold.
156	7	10	3	
171	-	5		
174		9		
177	13	15	2	
179	4	8	4	
184	7	4	3	
191	5	1	4	Seperated (children)
192	8	14	6	
182	10	15	5	
026	19	24	5	
207	20	23	3	
235	13	17	4	
238	6	2	4	
272	11	14	3	
277	11	19	8	
[illegible]	1	[illegible]	[illegible]	Different H/Hold
295	10	6	4	
309	4	1	3	
350	17	15	•	

CBS. 187/03/01

Mr. John Kekovole

c.c. Mr. H.J. Herr ✓
Mr. S.O. Akach

Re: ANOMALIES BETWEEN FIRST AND SECOND BASELINE POPULATION FOR RURAL ROADS

Further to the household case report of 24th October 1980, I hereby present a similar report for Busia Road 04 and South Nyanza Road 07.

In general during the exercise I observed some problems that arose due to misunderstanding of the defination of household. This has even made the comparison between first and second baseline difficult.

During the first baseline some enumerators covered those who were found in the compound though they were not sharing meals. Some covered usual residents and some covered independent sons to head of household though they were seperate household according to definition. This shows lack of supervision, for some of the above should have been detected before forms are sub-mitted to Nairobi. A household with 21 members should have been investigated further to check for the authentic members.

Second problem is handling of polygamous households. When the husband is still alive, all wives and their children constitute one household, but when he dies one wife is selected to remain the respondent usually first wife. Incase of a polygamous household of say four wives this will show a large decrease in household size.

Lastly, as the Road impact study survey has run for over a year, a seminar for the field staff would be necessary. This will help to solve some of the problems relating to completing of questionnaires and handling of some information.

A. Okeyo

27th November, 1980.

EAK/mw.

134 - Kimida Cheri has two wives. They are settled on different compounds and therefore different households.

The first enumerator used to interview the second wife Pauline Apiyo but the current enumerator interviews the first wife Tudea.

Wrongly included in the first baseline was Simon Otieno and his family of three members - son to Kimida. He has his own home.

181 - Juma Ojila has two wives. The first enumerator used to cover the two wives. The current enumerator only covers the second wife whose household has five members. The cluster is 624 - 627 for the two homes.

140 - Raphael Odeng

The wife to a son had joined in with her children as genuine members of the household by the second baseline. This is a normal change though they were not there during the first baseline.

143 - Michael Oluoch

One daughter got married, the other one was away during the second baseline. One death occurred during the survey period.

Wrongly included during the first baseline were sisters in-laws to Oluoch. They were not sharing meals by that time although they reside in the same compound.

150 - Titus Baraza

Wrongly included during the first baseline was Aloia Baraza with his family of five members - son to Titus. They were a separate household by definition.

126 - Charles Oki

Two sons Fratroba Magero and Walter Wasonga together with their families were wrongly included as member during the first baseline. They were separate households. Also wrongly included was second wife Christine Adhiambo Cluster 428 and 428.1

122 - Ledekia Baluda

During the first baseline a daughter who had domestic disputes with the husband was included. By the second baseline she had left.

...../ 2.

Also three sons who were met during first baseline had left for work up country. One was married, and the wife accompanied him.

094 - Monica Odero

Four children met during first baseline were away by the second baseline, thus the decrease in household size by four members.

085 - Babili Makokha

A son who was married formed a separate household by the second baseline- does not share meals anymore with parents.

One daughter got married during the survey period and one member a son was away.

072 - One member a daughter got married during the survey period. Four members joined the father in Nairobi where he is working.

068 - The co-wife Margaret joined the husband where he is working. She had two children.

Two children also joined boarding school, hence the drop in household size by five members.

215 - Lulendi Magwata

Three sons who are married were wrongly included together with their families during the first baseline. These three were separate households by definition.

The second baseline did not include them hence the drop in household size by eleven members.

217 - Mathew Afubua

Damiano Wabwire son to Afubua moved to Nairobi with his family. Also a maid to Damiano had left by the second baseline. These were genuine members by the first baseline hence a normal change.

062 - Okumu Kalundu

Abisolo and his family is now a separate household of four members. Abisolo is a son to Okumu who was included in the first baseline.

One member a daughter got married and one member was away by the time second baseline was being conducted. This is a normal change.

..../3.

108 - Zakaria Luta

Zakaria has two homes one in the Road Impact Cluster and the other one in Mumias. Four children included during the first baseline had moved to Mumias by the second baseline. Two deaths occurred during the survey period. This is a normal change.

052 - Faice Moi

First baseline included four children in boarding schools. The second baseline only included the wife and her brother who stay at home.

233 - Simon Ogola

One member went to Nairobi. Three others relatives met during first baseline had left by the second baseline time.

344 - Nuwa Okuku

Mirikoni son to Okuku together with his wife and a child now is a separate household. During the first baseline they were sharing meals.

Nuwa died two months ago and since he was a polygamist, the first wife will remain the respondent.

354 - Japherio Odudo

The son and his family of four members now constitute a separate household. A daughter who was separated joined the husband. A son to a daughter from Uganda had gone back by the second basline hence the drop in household size by six members. This is a normal change.

366 - Posiano Omunyinyi

There were four other relative from Uganda met during the first baseline. By the second baseline they had left for Uganda.

076 - Livingstone Ouma

Strongly included during the first baseline is a son and his family. Nicolas and his family was a separate household according to definition. They were not included in the second baseline.

073 - Aycliffe Madada

Strongly included in the first baseline were three sons married. These were separate household according to definition.

...../ 4.

These three accounted for seven members.

A daughter who was met during the first baseline had left by the second baseline. She had a child.

016 - Luka Lakitani

Three sons who were met during the first baseline had moved by the second baseline. They were married with children. During the first baseline they accounted for nine members.

079 - T. Nyangaga

Gedrude wife to a son had formed a separate household by the second baseline. She had four children, three daughters and a son, hence the drop in household size.

071 - Isaya Ojwang

Risper Akumu a wife to a nephew of Mzee Isaya was wrongly included in the first baseline. She had ten children. Also the husband Ojwang. These add up to 12 members wrongly included.

Also the second wife Margaret Akinyi had joined the husband by the second baseline. Margaret has four children, these are five members.

In all there was a drop by the above 17 members.

097 - Wrongly included in the first baseline were John Odero a teacher who was not staying at home and Jack Omondi who was schooling in Nairobi by that time.

During the second baseline Mrs.Monica Odero and her two children had joined the husband. Risper Atieno got married and Elisha Onyango was away in Kisumu.

061 - William Oloo a son to head was away with his family of four members during the second baseline. He had left for Kericho.

059 - During second baseline, the interviewer met nine (9) grandchildren who had paid a visit to the household. All these were included as members of the household thus augmenting the size. The second wife was away by this time.

051 - The wife to a son together with her five children were separate household by the second baseline. Timothy a son to head was away, hence the drop in household size by seven (7) members.

113 - Four children-daughters, were away by the time second baseline was being conducted.

122 - Wife to a son separated, she was a member by the first baseline. Two sons left for work up-country.

030 - Births recorded during survey period. All the thirteen (13) are members of the household - Polygamous home.

015 - During first baseline she was staying alone. By the second baseline, she had been joined by grandchildren who are schooling with in the impact area.

...../2

153 - The son Matinus Ochieng was wrongly included together with his family of four (4) members.

One death occured during the survey period and two members were away during the second baseline.

Two temporary members were wrongly included during the second baseline. These were visitors for a week.

225 - Wife to a son who had two children had joined the husband where he is working. They were true members of the household by the first baseline.

256 - Divorced wife had rejoined the household by the second baseline. She had three children but has left again since then.

252 - Wrongly included in the first baseline was Samwel Ouku and his family of six (6) members. This is a son to head and has his own home. Also Elida Aoko wife to a son and her three chilren. This totals to ten.(10) members wrongly included in the first baseline.

During second baseline, a wife to a son by the name Sarah Atieno and her two children were away.

Wrongly included again is Elida Aoko and her three children. Actual members of the household by the second baseline should have been four (4).

277 - Wrongly included during first baseline are two sons with their families viz Joseph Owiti and F. Ouko. These accounted for eight members during the first baseline. They were independant households - separate.

274. - Mr. Odhiambo a son who is married moved with his family to Kericho. One member by name Okwaro was away. Four daughters were not met by the second baseline hence the drop by eight (8) members. The above were true members of the household.

281 - Wrongly included in the first baseline was Noah Otuga a son and his family of six members. Two members joined during the survey period. Not there during second baseline was a son James Odenyo and his wife. They had no child.

257 - Wrongly included during first baseline were Lukas Ongour, his wife Turfosa Anyango and a child. This was a separate, independent household. Ongow has his own home.

Also wrongly included is Plister Gor Co-wife to head and her son Benjami.

...../3

240 - One member a daughter got married during the survey period. One member Peter Okelo was in Kericho by the second baseline. Second wife Nora Adhiambo divorced. She had three children and she left with them. These accounts for drop in household size by six members.

162 - The wife to the son divorced, she went away with a child. One death occured during the survey period hence the drop by three members.

159 Second baseline included two wives to sons and their four children. First baseline included one other relative who had left before second baseline.

The above are genuine members of the household since they share meals.

024 This was a polygamous household by the first baseline. During the survey period, the second wife was settled on her own home. This was a separate household by the second baseline. She has a number of children.

NB. No body was met at home to give the explanation. I went to the new home but the above explanation was given by the two enumerators.

Appendix VII

List of Standard MOTC Tables.

LIST OF STANDARD MOTC TABLES

1. TABLES RUN FROM "RRASTABS"

   A. ON CARDS

   B. TABLES PRODUCED:

   - ROAD NUMBER BY SAMPLE PERIOD - UNWEIGHTED
   - ROAD NUMBER BY SAMPLE PERIOD - WEIGHTED
   - POPULATION: SEX BY ROAD AND STRATA
   - POPULATION: OCCUPATION BY ROAD AND STRATA
   - POPULATION: SEX BY PROVINCE AND ROAD
   - POPULATION: SEX AND AGE GROUP BY PROVINCE AND ROAD
   - HEADS OF HOUSEHOLD EDUCATION AND MARITAL STATUS
   - HOLDING: HOLDING SIZE BY PROVINCE AND ROAD
   - STRUCTURES AND ASSETS BY PROVINCE AND ROAD

   C. COMMENTS:

   Table are run separtely for each round of the survey. Use the "IF" statement to select the appropriate round.

2. TABLES RUN FROM "RARTABI"

   A. ON DISKETTE 876

   B. TABLES PRODUCED:

   - AGE GROUP AND ROAD BY SCHOOL STATUS
   - PERSONS AT SCHOOL BY AGEGROUP AND TYPE SCHOOL
   - PERSONS NOT AT SCHOOL BY AGEGROUP AND HIGHEST GRADE
   - HEADS OF HOUSEHOLD: SEX OF HEAD AND MARITAL STATUS BY ROAD
   - HEADS OF HOUSEHOLD: SEX OF HEAD AND EDUCATION BY ROAD
   - HEADS OF HOUSEHOLD: SEX OF HEAD AND AGEGROUP BY ROAD
   - SIZE OF PLOT BY ROAD
   - CROPPING AREA AND CROPCODE BY ROAD
   - CROPPING AREA AND TENURE BY ROAD
   - CROPPING ARE AND MAJOR CROP GROUP BY ROAD
   - SOURCE OF WATER IN DRY SEASON AND ROAD BY DISTANCE TO WATER.
   - SOURCE OF WATER IN WET SEASON AND ROAD BY DISTANCE TO WATER
   - LISTENS TO RADIO BY ROAD
   - IMPROVE CATTLE COUNTS BY ROAD
   - UNIPROVED CATTLE COUNTS BY ROAD
   - SHEEP BY ROAD
   - GOATS BY ROAD

- PIGS, DONKEYS, CHICKENS BY ROAD
- CASE LEVEL CROPING AREAS FOR MAJOR CROP GROUPS BY ROAD
- ROUND I RESPONSE FOR RECORD 01 BY ROAD
- ROUND 2 RESPONSE FOR RECORD 01 BY ROAD

C. COMMENTS:

Tables are rerun separately for each round of this survey. Use the "IF"statement to select the appropriate round. Weights for these tables have been deleted; but may easily be reintroduced by overriding the diskette delete.

3. TABLES RUN FROM "RARTAB 3"

A. ON DISKETTE 2112

B. TABLES PRODUCED:

- RELATIONSHIP TO HEAD BY ROAD
- AVERAGE AGE OF CHILDREN UNDER 15 AND SEX BY ROAD
- ALL PERSONS PLACE OF BIRTH BY ROAD
- MARITAL STATUS OF HOUSEHOLD HEAD BY ROAD
- HEAD OF HOUSEHOLDS PLACE OF BIRTH BY ROAD
- CROPPING AREA BY ROAD
- HOLDING AREA BY ROAD
- AVERAGE MONTHS OF BREAST FEEDING BY ROAD
- MAIN NON-FARM ACTIVITY BY ROAD-CYCLICAL
- MAIN SECORNDAY NON-FARM ACTIVITY BY ROAD-CYCLICAL
- CROPS PLANTED AND SEED QUANTITY BY ROAD-CYCLICAL
- AREAS ADDED TO PRODUCTION AND CROP CODE BY ROAD-CYCLICAL
- TYPE OF FARM INPUT AND VALUE BY ROAD-CYCLICAL
- TYPE OF CROP SOLD AND SALES VALUE BY ROAD CYCLICAL
- TYPE OF CROP SOLD AND SALES QUANTITY BY ROAD-CYCLICAL
- TYPE OF CROP HARVESTED AND INSTORE BY ROAD-CYCLICAL
- PURPOSE OF TRIP BY ROAD-CYCLICAL
- MODE OF TRANSPORT BY ROAD-CYCLICAL
- MODE OF TRANSPORT, TIME TAKEN AND DISTANCE BY ROAD-CYCLICAL
- MODE OF TRANSPORT OF TOTAL TRIPS TAKEN BY ROAD-CYCLICAL
- PURPOSE OF TRIP AND TOTAL TRIPS TAKEN BY ROAD-CYCLICAL
- MODE OF TRANSPORT AND AVG. COST BY ROAD-CYCLICAL

- PURPOSE OF TRIP AND GOES BEYONG IMPACT AREA BY ROAD-CYCLICAL
- EXPENDITURE TYPE AND VALUE BY ROAD-CYCLICAL
- NUMBER OF PERSONS AND NUMBER OF FEMALES IN HOUSEHOLD BY ROAD
- PERSONS (GROUPED) IN HOUSEHOLD BY ROAD
- KINSHIP STRUCTURE BY ROAD
- DOES HOUSEHOLD HAVE HOLDING BY ROAD
- NUMBER OF PLOTS OPERATED BY ROAD
- NUMBER OF PLOTS ADDED BY ROAD-CYCLICAL
- AVG. PLOTS ADDED BY ROAD-CYCLICAL
- SALES FROM LIVESTOCK (KSH.) BY ROAD-CYCLICAL
- NON-FARM EARNINGS PER HOUSEHOLD BY ROAD-CYCLICAL
- CROPPING AREA PER HOUSEHOLD BY ROAD-CYCLICAL
- AREA ADDED, AREA CROPPED, HOLDING AREA BY ROAD-CYCLICAL
- VALUE OF CROP INPUTS PER HOUSEHOLD BY ROAD-CYCLICAL
- HARVEST AND SALES (IN KSH. AND KGS.) BY ROAD-CYCLICAL
- INDEX OF ROAD USE, TOTAL TRIPS, HOUSEHOLD TOTAL BY ROAD-CYCLICAL.
- FOOD AND NON-FOOD EXPENDITURES PER HOUSEHOLD BY ROAD-CYCLICAL
- MAJOR EXPENDITURES PER HOUSEHOLD BY ROAD-CYCLICAL

C. COMMENTS:

Tables are rerun for different rounds and for different cycle periods (e.g. first 6 months, second 6-months) In many tables weights have been excluded by entering an * in column 7-this indicates the line is treated as comments.

4. TABLES RUN FROM "RRASTAB 4"

A. ON DISKETTE 3574

B. TABLES PRODUCED:

- SEX OF HOUSEHOLD HEAD AND PLACE OF BIRTH BY ROAD
- SEX OF HOUSEHOLD HEAD AND AVERAGE AGE OF RESPONDENT BY ROAD.
- SEX OF HOUSEHOLD HEAD, AGE OF RESPONDENT, HEIGHT, WEIGHT AND MONTHS OF BREAST FEEDING BY ROAD.
- TYPES OF PORRIDGE, SEX OF HOUSEHOLD HEAD, AGE SUPPLEMENT ADDED, WEIGHT AND HEIGHT BY ROAD
- SUPPLEMENTS ADDED TO PORRIDGE, WEIGHT AND HEIGHT BY ROAD.
- COMMERCIAL FOOD USED, WEIGHT, AND HEIGHT BY ROAD
- HEIGHT, WEIGHT OF CHILDREN SICK DURING LAST 2 WEEKS BY ROAD.

- TYPE OF SICKNESS, HEIGHT, WEIGHT BY ROAD
- ACTION TAKEN IN RESPONSE TO SICKNESS BY ROAD
- WAS FOOD WITHDRAWN IN RESPONSE TO SICKNESS BY ROAD
- AVERAGE DISTANCE TO WATER IN WET SEASON, SOURCE OF WATER AND SEX OF HOUSEHOLD HEAD BY ROAD
- AVERAGE DISTANCE TO WATER IN DRY SEASON, SOURCE OF WATER AND SEX OF HOUSEHOLD HEAD BY ROAD
- SEWAGE DISPOSAL FACILITIES AND SEX OF HOUSEHOLD HEAD BY ROAD
- LISTEN TO RADIO AND SEX OF HOUSEHOLD HEAD BY ROAD
- LIVESTOCK AND SEX OF HOUSEHOLD HEAD BY ROAD
- STRUCTURES AND ASSETS AND SEX OF HOUSEHOLD HEAD BY ROAD
- PERSONS IN HOUSE, NUMBER OF CHILDREN AND SEX OF HOUSEHOLD HEAD BY ROAD
- KINSHIP STRUCTURE AND SEX OF HOUSEHOLD HEAD BY ROAD.
- SIZE OF HOLDING, PLOTS OWNED, CROPPING AREA AND SEX OF HOUSEHOLD HEAD BY ROAD.

C. COMMENTS:

As above.

5. TABLES RUN FROM "RRASTAB 5"

A. ON DISKETTE 3272

B. TABLES PRODUCED:

- MAIN NON-FARM INCOME AND COSTS BY ROAD
- SECONDARY NON-FARM INCOME AND COSTS BY ROAD
- CAPITAL AND INCOME TRANSACTIONS BY ROAD
- AREA ADDED TO CROPPING (SQUARE METERS) DRY ROAD
- VALUE OF FARM INPUTS BY ROAD
- HARVEST AND CROP DISPOSAL BY ROAD
- VALUE OF HARVEST AND CROP DISPOSAL BY ROAD
- AMOUNT OF HARVEST BY CROP CODE AND ROAD
- VALUE OF CROPS SOLD BY CROP CODE AND ROAD
- CHANGES IN SHEEP STOCK BY ROAD
- CHANGES IN GOAT STOCK BY ROAD
- CHANGES IN PIG STOCK BY ROAD
- CHANGES IN CHICKEN STOCK BY ROAD
- CHANGES IN CATTLE STOCK AND MILK PRODUCTION BY ROAD
- SOURCE AND VALUE OF REGULAR EXPENDITURE BY ROAD
- MAJOR EXPENDITURES BY TYPE AND ROAD
- HOUSEHOLD HARVEST AND DISPOSAL AMOUNTS BY ROAD

- HOUSEHOLD HARVEST, SALES, CROPPING AREA BY ROAD
- HARVEST AND SALES FOR MAJOR CROPS BY ROAD
- HARVEST AND SALES FOR MAJOR CROPS BY ROAD (CONTINUED)

C. COMMENTS:

As above

6. TABLES RUN FROM "RRASTAB 6"

A. ON DISKETTE 2564

B. TABLES PRODUCED:

- VALUE OF FARM INPUTS AND SEX OF HOUSEHOLD HEAD BY ROAD
- CROP HARVEST AND DISPOSAL (KILOS) BY SEX OF HOUSEHOLD HEAD AND ROAD
- CROP HARVEST AND DISPOSAL (VALUE) BY SEX OF HOUSEHOLD HEAD AND ROAD
- HARVEST IN KILOS BY TYPE OF CROP AND SEX OF HOUSEHOLD HEAD AND ROAD.
- VALUE OF CROPS SOLD BY TYPE OF CROP AND SEX OF HOUSEHOLD HEAD AND ROAD
- HOUSEHOLD LEVEL MAIN NON-FARM INCOME BY SEX OF HOUSEHOLD HEAD AND ROAD
- HOUSEHOLD LEVEL SECONDARY NON-FARM ACTIVITY INCOME BY SEX OF HOUSEHOLD HEAD AND ROAD.
- HOUSEHOLD LEVEL MAIN AND SECONDARY NON-FARM EMPLOYMENT BY SEX OF HOUSEHOLD HEAD AND ROAD
- AVERAGE HOUSEHOLD CAPITAL AND INCOME TRANSACTION BY SEX OF HOUSEHOLD HEAD AND ROAD
- AREA ADDED TO CROPS PER HOUSEHOLD BY SEX OF HOUSEHOLD HEAD AND ROAD
- FERTILIZER INPUTS, CROPPING AREA BY SEX OF HOUSEHOLD HEAD AND ROAD
- VALUE OF FARM INPUTS PER HOUSEHOLD BY SEX OF HOUSEHOLD HEAD AND ROAD
- VALUE AND AMOUNT OF LIVESTOCK FEED BY SEX OF HOUSEHOLD HEAD AND ROAD
- CROP HARVEST AND DISPOSAL PER HOUSEHOLD SHOWING CROPPING AREAS BY SEX OF HOUSEHOLD HEAD AND ROAD
- CYCLES REPORTING LIVESTOCK HANGES BY ROAD
- NUMBER AND VALUE PER HOUSEHOLD OF LIVESTOCK SLAUGHTERED BY SEX OF HOUSEHOLD HEAD AND ROAD
- TOTAL AND AVERAGE REGULAR EXPENDITURES PER HOUSEHOLD BY SEX OF HOUSEHOLD HEAD AND ROAD
- LIVESTOCK PURCHASES: NUMBER AND VALUE PER HOUSEHOLD BY SEX OF HOUSEHOLD HEAD AND ROAD
- LIVESTOCK BALANCES PER HOUSEHOLD BY SEX OF HOUSEHOLD HEAD AND ROAD

C. COMMENTS:

As above

7. TABLES RUN FROM "RRASTAB 7"

A. ON DISKETTE 3297

B. TABLES PRODUCED:

- TRIP FREQUENCY, DISTANCE, TIME BY PURPOSE FOR HOUSEHOLD WITH MALE HEAD BY ROAD
- TRIP FREQUENCY, DISTANCE, TIME, COST BY MODE OF TRANSPORT FOR HOUSEHOLDS WITH MALE HEAD BY ROAD
- AS ABOVE FOR FEMALE HEADED HOUSEHOLDS
- TRIP FREQUENCY BY INSIDE OR OUTSIDE IMPACT AREA BY SEX OF HOUSEHOLD HEAD BY ROAD

C. COMMENTS:

As above.