

Appendix

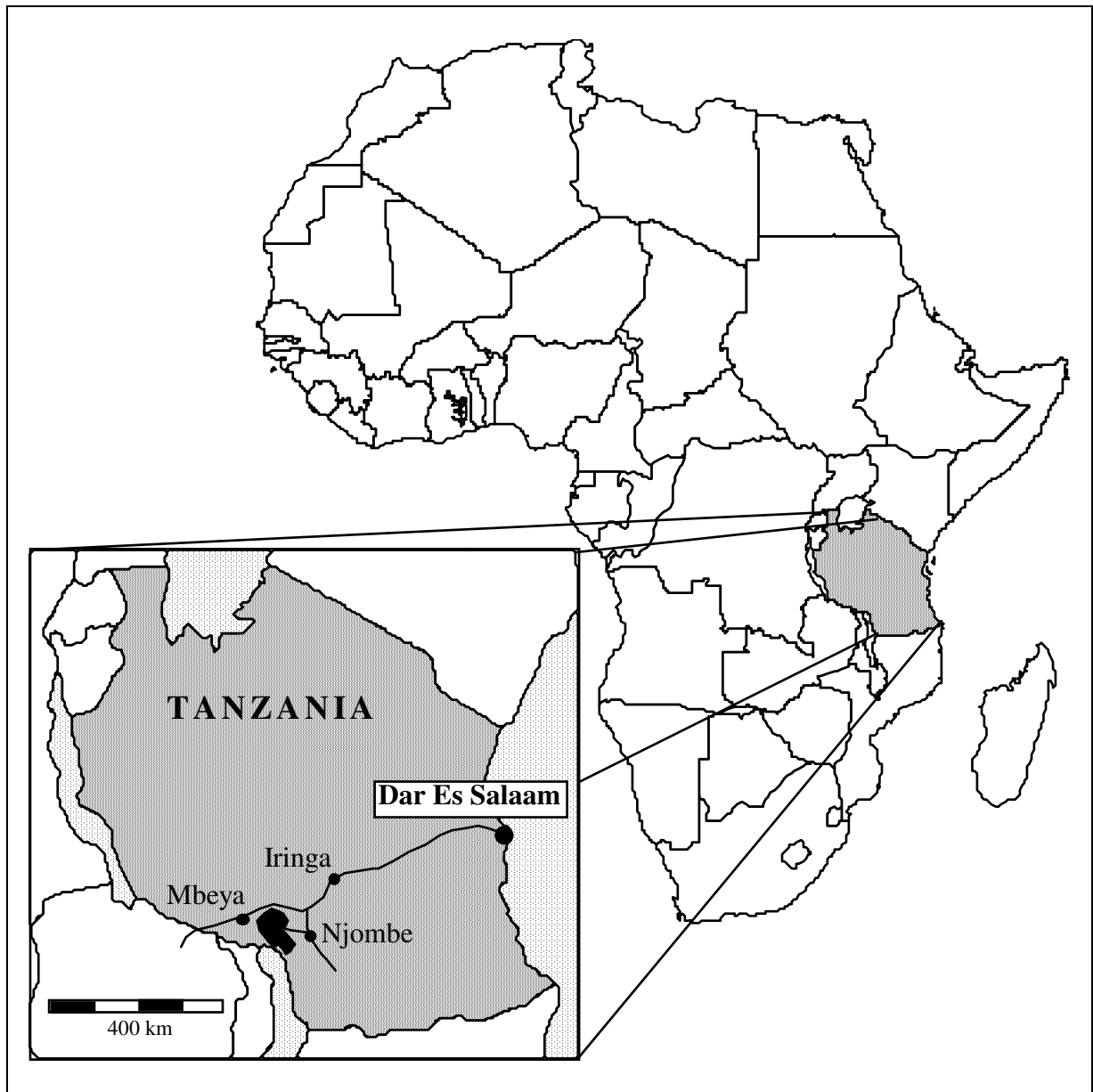
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Tanzania: Main Economic Indicators

Indicator	Year	
Calorie supply (Percentage of need)	1985	100 %
Life expectancy at birth	1987	53 Years
Population growth rate	1978-88	3.2 % (3.8 %)*
Growth rate of urban areas	1980-1990	10.8 %
% Population in urban areas	1985	22.3 %
Population density	1989	27.5 Inh/km ²
Inhabitants per hospital bed	1985	548
Literacy rate (>15 Years)	1985	85 %
GNP/Capita	1986	250 \$
Per capita income	1989	130 \$
Share of agriculture on GDP	1987	53.1 %
Share occupied in agricultural sector	1987	82 %
Share foodcrops grown for subsistence		70 %
External trade: Share Processed products	1981	11 %
External trade: Share agricultural products		75 %
Share second economy		30 %
Cars per 1000 Inhabitants	1987	3
* Estimation according to population census 1988 (Hofmeier 1993, p. 178)		

Location of the Makete District in Tanzania



Makete Integrated Rural Transport Project: Objectives and Results

Objective	Output	Results	Realisation	Education	Sustainability	Remarks
Promotion of Donkeys	144 donkeys und 120 panniers sold	Amount of donkeys in Makete increased by 74 %	Three donkey centres constructed, manual for panniers developed	Donkey training	Subsidies for donkeys and panniers	Panniers not used, donkeys only used for transport of crops
Production and promotion of wheelbarrows	58 sold, 76 used for road works; 47 given away	181 wheelbarrows in use	Development of a construction manual	Training of carpenters	No wheelbarrow produced, because demand to little.	Only used for road construction or commercial activities
Upgrading of local footpaths	27.3 km of footpaths improved	Makete counts more than 500 km of footpaths	Unpaid: 1586 days paid labour: 1144 days	Two foremen and 14 gang leaders trained	Villages continue to maintain the paths	Very positive feedback from population
Upgrading of roads and tracks	40.5 km of feeder roads and 11 km of district roads improved: = 51.5 km	Total district network 679 km	Unpaid labour: 32683 days paid labour: 21345 days	Training of 7 foremen, 10 gang leaders, manual (labour-based construction)	Support was only given on request from village	
Capacity building of a road maintenance unit	see above: road improvements		Equipment for labour based methods supplied, Criteria for prioritisation developed	14 Foreman and 1 road inspector trained in labour based construction	Only in self help or if financed by district or by communal taxes	Regional and District authorities often do not fulfil financial promises
Improvement of district workshop	Spare parts supplied, regular maintenance of district vehicles	Default of payments could not be stopped		Staff trained	Financial sustainability since take-over by district council not given	Proposition: Privatisation of workshop
Management consultancy for district transport service	District bus repaired	Objectives not fulfilled, vehicles often not in working order	Condition of roads make bus service during rains impossible	Training programmes not conducted	Bus service is financially not viable	Proposition: Sell of broken down vehicles to finance maintenance
Repair of motorised and promotion of hand driven grinding mills	25 motorised mills repaired, hand operated mills promoted	37 villages have improved grinding mills	Working Mills 1989: 37 1992: 55 Not working: 1989: 44 % 1991: 61 % 1992: 50 %	16 Seminars conducted, 6 mechanics trained	Financial viability often no given (subsidies by churches)	Maintenance by private operating mechanics recommended. Training in bookkeeping necessary.
Strengthening of planning capacity of district Council	Several seminars and training programmes conducted	Awareness on the local level is enhanced			Rural Transport is partly institutionalised on the national government level	Rural Travel & Transport is part of the Second Integrated Roads Programme of the World Bank

Source: MIRTP: Full Evaluation Report October 1992

MAKETE INTEGRATED RURAL TRANSPORT PROJECT

HOUSEHOLD INTERVIEW QUESTIONNAIRE I

Interviewer's Name: Village:
Interview Number:

Note: Before starting the interview, explain the aim of the survey.
The households have been selected **at random** for the interview. The interviewee should have no worries or concerns about why he or she has been selected.

PART A: HOUSEHOLD BASE DATA

1. HOUSEHOLD COMPOSITION

- 1.1 Total number of people presently living in the household:
(Exclude temporary visitors and persons, who are regularly absent.)

Age	Male	Female
Children (<16)		
16-45		
> 45		

- 1.2 Number of household members with primary school education
Number of household members with secondary school education

- 1.3 Present head of household: 1. Male ☐ 2. Female ☐

- 1.4 Main occupation of present head of household: (tick one)
☐ 0. No Occupation, ☐ 4. Businessman (Shop owner, Trader etc.)
☐ 1. Farmer, ☐ 5. Fundi
☐ 2. Village Chairman ☐ 6. Other
☐ 3. Other employee (Teacher, secretary, extension officer, etc.)

2. HOUSEHOLD POSSESSIONS (IN WORKING ORDER)

- ☐ 1. Kerosene Stove ☐ 4. Sewing Machine
☐ 2. Kerosene Lamp ☐ 5. Tin Roof
☐ 3. Radio

3. SOURCES OF CASH INCOME

Identify the main source of cash income for the household (tick one)

- ☐ 1. Sale of Agricultural Produce ☐ 7. Timber
☐ 2. Sale of Livestock ☐ 8. Artisan
☐ 3. Sale of Casual Labour in the Village ☐ 9. Trading
☐ 4. Sale of Casual Labour outside Village ☐ 10. Brewing
☐ 5. Regular Paid Employment ☐ 11. Other
☐ 6. Cash Remitted by Relative

4. HOUSEHOLD EXPENDITURE

Estimate of household cash expenditure in the last 4 weeks:

1. FoodTsh
2. Consumer goods (Household items, clothes, tools etc.)Tsh
 - of which produced in MaketeTsh
 - of which produced in TanzaniaTsh
 - of which imported to TanzaniaTsh
3. Medical ExpensesTsh
4. Village Contributions/SchoolfeesTsh
5. Social OccasionsTsh
6. Beer and RefreshmentsTsh
7. Payments to RelativesTsh
8. TransportTsh
9. Other ItemsTsh

10.Amount bartered

.....Tsh

PART B: TRANSPORT ACTIVITIES

5. MEANS OF TRANSPORT:

5.1 Which means of transport in working order does your household possess?

Means of Transport	Number in working order	Number not in working order
Donkey		
Wheelbarrow		
Bicycle		
Animal Drawn Cart		
Motor-Vehicle		
Other Vehicles		

If the household possesses any donkeys, wheelbarrows or bicycles (in working order) fill out the Questionnaire II after finishing this Questionnaire I
Only ask the questions 5.2 and 5.3 if no means of transport are owned

5.2 Which of the following means of transport would be most useful for the transport needs of your household? For what price would you buy your desired means of transport?

Preferred Vehicle	Willingness to pay for preferred vehicle [Tsh]
1. Wheelbarrow	
2. Bicycle	
3. Donkey	
4. Animal Drawn Cart	

5.3 Why did you not purchase your most preferred vehicle? (tick one)

- ☐ 1. too expensive
☐ 2. can not purchase it in Makete
☐ 3. do not know how to take care or repair it
☐ 4. other (specify).....

6. TRANSPORT ACTIVITIES

How are the following transport activities usually done?

Purpose/ Destination	For all households				Only if not walking	
	Name of Place	Number of Trips	Walking time (one way)	Means of Transport	Travel Time (one way)	Who goes?
Water						
Firewood						
Village Center						
Grinding mill						
MCH Clinic						
Dispensary						
Hospital						
First Market outs. Village						
2nd Market outs. Village						
3rd Market outs. Village						
Other Place outs. Village						
Other Place outs. Village						

Number of Trips:

Walking time:

Means of Transport:

Travel Time

Who goes?

How many persons are travelling per day or week or month or year

Walking time means the time used to walk one way to the mentioned place.

Fill in the means of transport used (see instructions)

Write down the actual travel time for a one-way trip using the mode of transport.

Which member of the household usually travels? (see instructions)

7. USE OF IMPROVED FOOTPATHS

7.1 Do members of your household use any footpath (not road), which had been improved? Yes/No If no, continue with question 8.

7.2 If yes, what is the mayor change after the improvement? (tick several)

- ☐ 1. There has never been a real advantage.
- ☐ 2. The improvements have already disappeared
- ☐ 3. No advantages in the rainy season
- ☐ 4. We can reach places, which we could not reach before
- ☐ 5. We can use other means of transport (eg. bicycle) on the path
- ☐ 6. Safety is better
- ☐ 7. Faster travelling

8. If yes, how much is the time saved per one way trip?

Purpose			
Time saved			

8. USE OF GRINDING MILLS

8.1 How does the household mainly grind its flour? (tick one)

- 1. Grind all its flour traditionally ☐
- 2. Grind all its flour at home with a hand grinding mill ☐
- 3. Grind all its flour elsewhere with a hand grinding mill ☐
- 4. Use a motorised grinding mill ☐

8.2 If the answer is 4:

How much is ground at one time?.....

Costs for grinding.....Tsh

8.3 If the answer is 1, 2 or 3:

Why don't you (always) use a motorised grinding mill? (tick one)

- 1. No grinding mill existent ☐
- 2. Mill too far away ☐
- 3. Mill often not in working order ☐
- 4. Grinding too expensive ☐
- 5. Other reasons..... ☐

PART C: AGRICULTURE

9. CROP PRODUCTION

9.1 For each plot of land cultivated last twelve months obtain the following information:

Plot	1	2	3	4	5	6	7	8	9	10
Total Area										
Walking time										
Plot	11	12	13	14	15	16	17	18	19	20
Total Area										
Walking time										

9.2 Seasonal Crop Production Activities

Season	Clearing, Cultivation, Planting	Weeding	Harvesting
Duration of the Working Season	weeks	weeks	weeks
Number of trips			
Means of Transport used			

9.3 Purchase of Farm Inputs in the last twelve months.

Input	Weight purchased	Means of Transport
Fertiliser		
Seeds		

10. CROP HARVESTING AND MARKETING

10.1 List the crops harvested and marketed in the last twelve months

	Weight harvested	Weight Marketed	Price [Tsh]
Pyrethrum			
Sorghum			
Maize			
Wheat			
Finger Millet			
Irish Potato			
Sweet Potato			
Beans			
Peas			
Other Vegetables			
Bananas			
Peaches			
Other Fruits			
Ulanzi			
Other			
TOTAL			

10.2 How did you transport the crops from the field?

Crop harvested	Weight transported	Means of transport used	Costs in Tsh (if hired transport)
Total weight		Cross check with total of question 10.1	

10.3 Marketing of Crops in the Last twelve Months?

Crop marketed (question 10.1)	Place of marketing	Weight marketed	Mode of Transport	Costs for Transport (Tsh)
Total weight				

Calculate the total weight marketed and check with total amount marketed in question 10.1
Check if all mentioned places of marketing are listed in question 6?

10.4 Other Products Marketed (except big animals: cattle, donkeys, pigs, sheep, etc)

Product	Place of marketing	Weight marketed	Mode of Transport	Costs (Tsh)
Total weight				

Fill out the questionnaire II only for the households owning donkeys, bicycles or wheelbarrows?

HOUSEHOLD INTERVIEW QUESTIONNAIRE II **FOR APPROPRIATE MEANS OF TRANSPORT**

11. DONKEYS

- 11.1 Purchase of Donkeys
 1. Number of female Donkeys
 2. When was the last donkey purchased
 3. At what price?Tsh
 4. Number of donkeys dying in the last 12 months
- 11.2 Costs for Donkeys last 12 months?
 1. Veterinary care / medicineTsh
 2. Additional fodderTsh
 3. Shelter / FenceTsh
 4. PannierTsh
 5. Other costsTsh
- 11.3 How often do you use the donkey?times/month
 1. Transport of own goods
 2. Transport of persons from household
 3. Lending or renting out to other households
 4. Ploughing
 5. other uses.....
- 11.4 If the donkey is rented out to other households
 1. Number of donkeys
 2. Payments received last twelve months for renting:Tsh
- 11.5 Loading of the donkey:

Purpose	Destination	Weight loaded per	How many trips	Number of
1				
2				

12. WHEELBARROWS

- 12.1 Purchase of Wheelbarrow
 1. When was the last wheelbarrow purchased?
 2. Was it new? Yes/No
 3. At what price?Tsh
 4. Type: 1. Wood [] 2. Metal []
- 12.2 Was it necessary to repair the wheelbarrow yes/no
 If yes, how often since purchase?
 Which part was repaired?
 CostsTsh
- 12.3 How often do you use the wheelbarrow?times/month
- 12.4 Load carrying

Purpose	Destination	Weight loaded per wheelbarrow	How many trips with wheelbarrow
1			
2			

13. BICYCLE

- 13.1 Purchase of Bicycle
 1. When was the last bicycle purchased?
 2. Was it new? 0.No 1. Yes 2. Self made
 3. At what price?Tsh
- 13.2 Was it necessary to repair the bicycle yes/no
 If yes, how often since purchase?
 Which part was repaired?
 CostsTsh/
- 13.3 How often do you use the bicycle?times/month
- 13.4 Load carrying

Purpose	Destination	Weight loaded per bicycle	How many trips with
1			

2			
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Makete Household Survey 1994

Survey 1994	Unen- amwa	Madi- hani	Uten- gule	Kidope	Bulo- ngwa	Ihela	Mpan- gala	Ngoje	Ngo- nde	Mata- mba	Total
Persons per HH	5.3	4.2	4.6	6.2	5.2	5.1	4.0	5.1	4.5	4.5	4.9
Female Adults/Male	1.15	1.00	0.82	1.23	1.07	1.35	1.12	1.09	1.20	1.14	1.13
Children	2.6	2.1	1.9	3.0	2.5	2.9	1.7	2.2	2.1	2.0	2.3
Persons >45	1.0	0.3	0.9	0.7	0.8	0.9	0.6	0.9	0.4	0.6	0.7
Primary Education	39%	35%	52%	45%	43%	40%	50%	53%	52%	51%	46%
Secondary Education	5%	0%	7%	1%	2%	1%	2%	4%	1%	2%	2%
Female headed HH	24%	7%	27%	5%	15%	14%	10%	6%	16%	12%	13%
Main Occupation of Head of Household											
Farmer	90%	93%	93%	82%	89%	76%	90%	88%	87%	88%	87%
No occupation	0%	0%	7%	0%	1%	0%	3%	0%	0%	1%	1%
Village Chairman	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Employee (Teacher,Secr..)	5%	7%	0%	5%	4%	10%	0%	6%	6%	4%	5%
Businessman	0%	0%	0%	0%	0%	0%	0%	0%	6%	3%	1%
Fundi	5%	0%	0%	14%	5%	14%	7%	6%	0%	4%	6%
Other	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Household Possessions in Working Order											
Kerosene Stove	10%	0%	7%	0%	4%	5%	0%	0%	3%	1%	3%
Kerosene Lamp	71%	73%	53%	41%	59%	62%	37%	29%	35%	35%	48%
Radio	52%	33%	40%	45%	44%	52%	30%	18%	32%	28%	38%
Sewing Machine	14%	7%	7%	0%	7%	5%	0%	6%	13%	6%	6%
Tin Roof	43%	13%	47%	36%	36%	48%	30%	35%	19%	27%	33%
Sources of Cash Income											
Sale of Agricultural Products	90%	80%	93%	86%	88%	38%	77%	76%	77%	77%	77%
Sale of Livestock	0%	0%	0%	5%	1%	0%	0%	0%	0%	0%	1%
Sale of Casual Labour in the Village	0%	7%	0%	0%	1%	5%	0%	0%	0%	0%	1%
Sale of Casual Labour outside the Village	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Regular Paid Employment	5%	7%	0%	0%	3%	14%	0%	0%	6%	3%	4%
Cash Remitted by Relatives	0%	0%	0%	5%	1%	14%	13%	6%	10%	10%	7%
Timber	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
Artisan	5%	7%	7%	5%	5%	24%	10%	6%	0%	5%	8%
Trading	0%	0%	0%	0%	0%	0%	0%	6%	6%	4%	2%
Brewing	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Other	0%	0%	0%	0%	0%	0%	0%	6%	0%	1%	1%
Expenditure last month (US\$ 1994)											
Total	29.65	37.98	43.58	34.47	35.68	29.98	17.70	20.75	22.55	20.36	28.00
Estimated Barter	0.37	1.54	3.60	0.39	1.28	0.07	0.00	0.00	0.53	0.22	0.65
Total excluding Barter	29.28	36.44	39.97	34.08	34.39	29.91	17.70	20.75	22.02	20.14	27.35
Food	4.78	3.85	6.44	6.80	5.54	5.96	3.55	3.94	4.06	3.85	4.82
Local Consumer Goods	0.00	0.00	0.00	0.60	0.18	0.35	1.00	0.86	0.99	0.99	0.56
National Consumer Goods	4.18	3.05	5.24	4.32	4.21	5.19	3.85	4.47	4.84	4.43	4.40
Imported Consumer Goods	1.42	1.85	2.65	1.51	1.79	4.37	2.01	3.08	1.90	2.22	2.29
Medical Expenses	7.38	3.36	3.16	2.59	4.22	3.47	1.91	0.89	2.65	1.98	3.12
Fees/Taxes	2.94	3.86	3.75	2.96	3.30	1.02	0.86	1.22	0.69	0.87	1.92
Social Occasions	2.55	0.83	6.47	6.68	4.25	5.81	0.88	1.20	1.50	1.18	3.05
Alcohol/Soft Drinks	1.60	1.92	1.13	5.28	2.68	1.02	0.96	1.14	1.00	0.99	1.72

Survey 1994	Unen- amwa	Madi- hani	Uten- gule	Kidope	Bulo- ngwa	Ihela	Mpan- gala	Ngoje	Ngo- nde	Mata- mba	Total
Transfers to Relatives	0.83	1.57	10.26	1.49	3.12	1.45	0.13	2.38	0.26	0.70	1.81
Transport	3.50	3.28	0.77	1.18	2.20	0.68	0.56	0.98	0.74	0.70	1.34
Other Expenditure	0.09	12.87	0.10	0.67	2.89	0.58	1.99	0.59	3.41	2.23	2.32
Households possessing IMT in Working Order											
Donkeys	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	8.0%	5.4%	0.0%	4.2%	1.9%
Wheelborrows	0.0%	0.0%	0.5%	0.0%	1.0%	0.0%	1.3%	0.0%	0.0%	0.5%	0.3%
Bicycles	0.9%	1.3%	2.1%	0.4%	0.9%	3.6%	3.3%	8.1%	5.1%	5.0%	2.7%
Desired Means of Transport, if no IMT Possessed											
No IMT desired	4.8%	0.0%	0.0%	4.8%	2.9%	5.0%	3.7%	7.7%	4.0%	4.6%	3.9%
Wheelborrow	4.8%	21.4%	35.7%	0.0%	12.9%	0.0%	0.0%	0.0%	0.0%	0	5.8%
Donkey	9.5%	7.1%	28.6%	42.9%	22.9%	10.0%	77.8%	46.2%	4.0%	43.1%	29.7%
Animal Drawn Cart	4.8%	0.0%	0.0%	9.5%	4.3%	0.0%	0.0%	7.7%	0.0%	1.5%	2.6%
Bicycle	76.2%	71.4%	35.7%	42.9%	57.1%	85.0%	18.5%	38.5%	92.0%	50.8%	58.1%
Willingness to pay for desired IMT (US\$ 1994)											
Wheelborrow	1.93	8.37	5.47		6.21						6.21
Donkey	6.76	19.31	14.96	11.8	12.43	5.79	21.74	9.65	28.96	19.23	16.15
Animal Drawn Cart	19.31			19.31	19.31			7.72		7.72	16.41
Bicycle	19.79	17.57	16.6	29.82	21.09	16.14	21.24	33.18	21.48	22.95	20.9
Why was no IMT purchased?											
Wheelborrow											
Too Expensive		66.7%	80%		66.7%						66.7%
Maintenance Problems	100%		20%		22.2%						22.2%
Other		33.3%			11.1%						11.1%
Donkey											
Too Expensive	100%	100%	75.0%	66.7%	75.0%	50.0%	84.2%	100%	100%	88.5%	81.8%
Not Available in Makete				33.3%	18.8%	50.0%	10.5%			7.7%	13.6%
Other			25.0%		6.3%		5.3%			3.8%	4.5%
Bicycle											
Too Expensive	93.8%	90.0%	100%	75.0%	89.7%	82.4%	100%	100%	100%	100%	92.0%
Not Available in Makete				12.5%	2.6%						1.1%
Maintenance Problems	6.2%				2.6%						1.1%
Other		10.0%		12.5%	5.1%	17.6%					5.8%
Use of Grinding Mills											
Usual Way of Grinding											
Traditionally	0%	7%	0%	0%	1%	0%	0%	0%	0%	0%	1%
Handgrinding home	52%	13%	53%	29%	38%	10%	0%	0%	0%	0%	17%
Handgrinding neighbour	5%	0%	20%	38%	17%	0%	0%	0%	0%	0%	7%
Motorised Grinding Mill	43%	80%	27%	38%	46%	90%	100%	100%	100%	100%	76%
Why is no motorised Mill used?											
No Mill Existent	17%	0%	9%	0%	8%	0%	0%	0%	0%	0%	8%
Mill too far away	58%	100%	73%	0%	44%	0%	0%	0%	0%	0%	43%
Mill not in Working Order	0%	0%	0%	7%	3%	0%	0%	0%	0%	0%	3%
Grinding too expensive	25%	0%	18%	93%	46%	100%	0%	0%	0%	0%	48%

Survey 1994	Unen- amwa	Madi- hani	Uten- gule	Kidope	Bulo- ngwa	Ihela	Mpan- gala	Ngoje	Ngo- nde	Mata- mba	Total
Agricultural Production											
Fields											
Number of Plots	6.5	7.4	8.5	9.0	7.8	8.1	5.5	5.2	5.7	5.6	6.9
Total Size of Fields (acres)	4.3	5.2	7.9	8.8	6.6	4.9	3.3	4.0	4.5	3.9	5.2
Average Distance to the Fields [km]	3.6	4.3	4.1	3.9	4.0	4.1	3.6	2.3	3.2	3.1	3.6
Purchase of Fertiliser											
% HH purchasing fertiliser	5%	7%	7%	0%	4%	86%	50%	94%	100%	79%	48%
Weight/ (HH purchasing fertiliser).	2	50	1	0	18	110	107	139	147	135	125
%HH walking	100%	100%	100%		100%	100%	86%	87%	100%	94%	95%
%HH using Wheelb.											
%HH using Donkey							14%	7%		5%	4%
%HH using Bicycle								7%		1%	1%
Purchase of Seeds											
% HH purchasing Seeds	14.3%	7%	0%	0%	6%	14%	10%	0%	15%	10%	9%
Weight/ (HH purchasing Seeds)	4	10	0	0	6	27	13	0	12	13	14
%HH walking	100%	100%			100%	100%	100%		100%	100%	100%
Harvesting of Agricultural Products											
All Products [t]	1.72	2.25	1.57	2.64	2.08	2.05	4.01	3.13	2.38	3.17	2.57
Crops [t]	1.41	2.14	1.38	2.44	1.86	1.31	3.05	1.98	1.76	2.30	1.99
Ulanzi [t]	0.31	0.11	0.20	0.13	0.19	0.65	0.97	1.23	0.64	0.89	0.56
Transport from the Field											
Products transp. fr. Field [t]	1.72	2.20	1.42	2.64	2.03	1.91	2.17	2.63	2.04	2.22	2.10
Tkm "	6.2	10.6	6.3	9.9	8.2	7.6	7.6	5.8	6.7	6.9	7.5
% by Walking	95%	100%	100%	87%	95%	100%	86%	84%	99%	89%	92%
% by Donkey							5%	13%		6%	3%
% hired Donkey							5%			2%	1%
% by Bicycle								2%	1%	1%	
% hired Motor Vehicle							2%	2%		1%	
% by Hired Porters	5%			12%	3%		2%			1%	2%
Marketing of Agricultural Products											
All Products [t]	0.47	0.82	0.27	0.58	0.53	0.41	2.67	1.20	0.97	1.67	1.04
Crops [t]	0.38	0.80	0.21	0.35	0.42	0.20	2.09	0.62	0.75	1.24	0.77
Ulanzi [t]	0.08	0.02	0.06	0.03	0.05	0.21	0.58	0.61	0.23	0.45	0.25
Revenue All products [\$]	46.77	35.07	39.47	64.00	48.06	27.37	113.13	99.53	145.14	122.60	79.39
Revenue Crops [\$]	44.30	34.60	37.70	48.30	43.20	21.08	96.00	79.20	128.70	106.70	68.23
Crop Marketing											
Field	0%	1%	14%	0%	2%	0%	40%	4%	4%	27%	20%
Home	44%	7%	16%	16%	20%	29%	14%	35%	6%	14%	16%
Village	0%	1%	0%	2%	1%	3%	8%	0%	13%	8%	6%
Street	0%	0%	0%	0%	0%	0%	30%	0%	0%	20%	14%
External	56%	91%	69%	82%	77%	68%	8%	61%	77%	31%	43%

Survey 1994	Unen- amwa	Madi- hani	Uten- gule	Kidope	Bulo- ngwa	Ihela	Mpan- gala	Ngoje	Ngo- nde	Mata- mba	Total
Means of Transport for Crop Marketing											
Tons transported	0.22	0.73	0.15	0.30	0.33	0.14	0.94	0.38	0.67	0.71	0.48
% by Walking	100%	100%	100%	88%	96%	100%	24%	72%	100%	61%	73%
% by Wheelbarrow	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% by Donkey	0%	0%	0%	0%	0%	0%	6%	0%	0%	3%	2%
% Hired Donkey	0%	0%	0%	0%	0%	0%	8%	0%	0%	4%	2%
% by Bicycle	0%	0%	0%	0	0%	0%	0%	0%	0%	0%	0%
% Hired Motor Vehicle	0%	0%	0%	0%	0%	0%	19%	28%	0%	13%	9%
% by Hired Porters	0%	0%	0%	12%	4%	0%	43%	0%	0%	20%	14%
Marketing of Other Products											
Field	0%	100%	0%	0%	3%	20%	0%	8%	0%	2%	4%
Home	100%	0%	100%	24%	48%	7%	2%	0%	3%	2%	10%
Village	0%	0%	0%	65%	42%	52%	68%	21%	9%	43%	43%
Street	0%	0%	0%	0%	0%	0%	15%	53%	16%	26%	19%
External	0%	0%	0%	11%	7%	22%	15%	18%	72%	27%	23%
Means of Transport to Market (Other Products)											
Tons transported	0.00	0.00	0.00	0.18	0.05	0.15	0.59	0.53	0.21	0.43	0.24
% transp. by walking				100%		100%	100%	100%	100%	100%	
Marketing of All Agricultural Products											
Field	0%	3%	11%	0%	2%	10%	31%	6%	3%	21%	16%
Home	54%	7%	35%	19%	26%	18%	12%	18%	5%	11%	15%
Village	0%	1%	0%	27%	9%	28%	21%	10%	12%	17%	16%
Street	0%	0%	0%	0%	0%	0%	27%	25%	4%	21%	16%
External	46%	89%	54%	54%	63%	44%	10%	41%	76%	30%	38%
Means of Transport											
Tons transported	0.218	0.73	0.15	0.47	0.39	0.29	1.53	0.91	0.89	1.14	0.72
% by Walking	100%	100%	100%	92%	97%	100%	53%	88%	100%	75%	82%
% by Wheelbarrow	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% by Donkey	0%	0%	0%	0%	0%	0%	4%	0%	0%	2%	1%
% Hired Donkey	0%	0%	0%	0%	0%	0%	5%	0%	0%	2%	2%
% by Bicycle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% Hired Motor Vehicle	0%	0%	0%	0%	0%	0%	12%	12%	0%	8%	6%
% by Hired Porters	0%	0%	0%	8%	3%	0%	27%	0%	0%	12%	10%
Transport Activities											
Water Collection											
Trips/annum	1373	1144	1022	1244	1215	1025	840	1031	918	913	1055
Distance [km]	1.2	1.8	1.9	0.9	1.4	1.8	1.5	1.8	2.1	1.8	1.6
Time	855	1010	920	576	816	915	541	914	934	779	811
Tonnes	24.7	17.2	18.4	18.7	20.0	18.5	15.1	18.6	16.5	16.4	18.2
Tkm	30.8	30.3	33.1	17.3	27.1	33.0	19.5	32.9	33.6	28.0	28.2
% HH Walking	95%	100%	100%	100%	99%	100%	100%	100%	100%	100%	99%
% HH by Bicycle	5%				1%						1%

Survey 1994	Unen- amwa	Madi- hani	Uten- gule	Kidope	Bulo- ngwa	Ihela	Mpan- gala	Ngoje	Ngo- nde	Mata- mba	Total
Firewood Collection											
Trips/annum	280	327	392	475	372	337	206	180	131	171	276
Distance [km]	5.2	4.9	3.8	6.0	5.1	5.2	3.8	4.0	8.0	5.5	5.3
Time	397	344	385	806	507	451	204	168	266	221	370
Tonnes	7.0	8.2	9.8	11.9	9.3	8.4	5.2	4.5	3.3	4.3	6.9
Tkm	39.7	36.9	38.5	80.6	51.4	45.1	20.4	16.8	26.6	22.1	37.3
% HH Walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Village Centre											
Trips/annum	255	201	187	198	213	208	330	127	114	200	206
Distance [km]	1.7	2.7	1.5	1.6	1.9	1.2	1.1	1.6	2.0	1.6	1.6
Time	142	208	157	153	162	141	134	103	104	115	138
% HH Walking	100%	100%	100%	100%	100%	100%	100%	94%	93%	97%	99%
% HH by Bicycle								6%	3%	3%	1%
Grinding Mill											
Trips/annum	42	41	29	81	51	31	21	26	26	24	36
Distance [km]	5.4	9.5	11.6	1.6	6.2	4.9	0.9	1.5	1.7	1.4	3.7
Time	127	188	158	69	129	71	8	17	20	15	71
Tonnes	0.8	0.8	0.5	1.6	1.0	0.7	0.4	0.5	0.5	0.5	0.7
Tkm	10.2	15.0	12.7	5.3	10.2	6.1	0.7	1.3	1.6	1.2	5.6
% HH Walking	100%	100%	100%	100%	100%	100%	100%	94%	100%	99%	100%
% HH using Donkeys								6%		1%	1%
Trips to the Fields											
Trips/annum	199	386	288	347	300	150	139	244	225	196	235
Distance [km]	3.6	4.3	4.1	3.9	4.0	4.1	3.6	2.3	3.2	3.1	3.6
Time	327	909	666	594	597	369	231	278	352	290	429
Tonnes	1.7	2.2	1.4	2.6	2.0	1.9	2.2	2.6	2.0	2.2	2.1
Tkm	6.2	10.6	6.3	9.9	8.2	7.6	7.6	5.8	6.7	6.9	7.5
% HH Walking	100%	100%	100%	100%	100%	100%	100%	94%	100%	100%	100%
% HH by Bicycle								6%			
Trips to MCH Clinic											
Trips/annum	6	8	4	11	7	8	7	6	7	7	7
Distance[km]	3.1	2.8	1.3	5.8	3.8	1.1	2.0	1.4	2.8	2.2	2.7
Time	10	11	3	30	15	4	8	4	10	8	10
% HH Walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Trips to Dispensary											
Trips/annum	23	0	16	15	14	0	10	8	7	8	10
Distance [km]	7.2	15.0	1.5	9.1	6.5	0.0	4.2	4.0	12.0	7.2	6.9
Time	65	1	9	64	40	0	18	16	47	29	30
% HH Walking	1.00	100%	100%	94%	98%	no data	100%	93%	88%	94%	97%
% HH by Bicycle								7%	12%	6%	3%
% HH Using Other Means				6%	2%						1%

Survey 1994	Unen- amwa	Madi- hani	Uten- gule	Kidope	Bulo- ngwa	Ihela	Mpan- gala	Ngoje	Ngo- nde	Mata- mba	Total
Trips to Hospital											
Trips/annum	9	11	4	9	8	19	2	3	6	4	8
Distance [km]	8.7	6.9	12.0	10.5	9.3	4.5	14.9	9.7	13.4	12.9	9.5
Time	40	34	24	45	37	43	8	17	41	23	31
% HH Walking	100%	100%	100%	95%	98%	95%	75%	71%	87%	82%	92%
% HH by Bus							13%		13%	10%	4%
% HH Other Means				5%	2%	5%	12%	29%		8%	4%
All Trips to all Health Facilities											
Trips/annum	38	19	24	34	30	27	19	17	20	19	25
Distance [km]	6.8	5.3	3.3	8.4	6.6	3.5	4.6	4.2	9.1	6.5	6.5
Time	115	46	36	140	92	47	34	40	98	61	72
Internal Marketing											
Trips/annum	0.0	0.3	0.0	8.0	2.5	5.7	32.6	21.4	7.5	20.2	10.9
Time	0.0	0.2	0.0	3.2	1.0	1.7	9.2	8.5	3.7	6.9	3.8
Tonnes	0.00	0.01	0.00	0.16	0.05	0.11	0.65	0.45	0.15	0.40	0.22
tkm per annum	0.00	0.02	0.00	0.25	0.08	0.14	0.73	0.68	0.30	0.55	0.30
External Marketing											
Trips/annum	11	36	7	16	17	9	13	24	37	25	20
Time	27	62	20	58	42	11	50	60	116	79	55
Tonnes	0.22	0.73	0.15	0.31	0.34	0.18	0.25	0.49	0.74	0.50	0.39
tkm per annum	2.15	4.96	1.62	4.66	3.37	0.90	4.00	4.80	9.32	6.29	4.39
Trips to External Markets											
Trips/annum	108	86	93	169	119	62	56	92	79	73	91
Distance [km]	8.2	8.8	11.7	12.3	10.2	5.4	6.1	7.7	12.7	9.2	9.2
Time	453	425	534	1049	644	186	186	348	486	341	450
Mode of Transport to 1st market											
% HH Walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Mode of Transport to 2nd market											
% transp. by walking	100%	100%	100%	100%	100%	100%	93%	100%	86%	93%	97%
% HH Bicycle									14%	5%	2%
% HH Other Means of Transport							7%			2%	1%
Mode of Transport to 3rd market											
% HH Walking	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%
Other Trips outside the village											
Trips/annum	16	11	0	50	22	17	67	49	34	50	34
Time	65	138	10	154	112	36	103	89	97	98	93
% HH Walking	70%	60%		70%	60%	50%	83%	73%	58%	70%	64%
% HH Bicycle									8%	3%	2%
% HH Bus	30%	40%	100%	30%	40%	50%	13%	27%	34%	25%	33%
% HH Other Means of Transport							4%			2%	1%
Total Transport Activities											
Trips/annum	2310	2214	2035	2606	2324	1863	1711	1788	1554	1665	1970
Time	2416	3131	2856	3390	2948	2183	1347	1875	2263	1828	2346
Time(including other trips)	2481	3269	2866	3544	3060	2219	1450	1964	2360	1926	2439
Tonnes	34	29	30	35	33	30	24	27	23	24	29
tkm per annum	89	98	92	118	100	93	53	62	78	65	83

Makete Household Survey 1986/87

Survey 1986/87	Unen- amwa	Madi- hani	Uten- gule	Kidope	Bulo- ngwa	Ihela	Mpan- gala	Ngoje	Ngo- nde	Mata- mba	Total
Persons per HH	5.3	4.2	5.2	4.5	4.8	4.9	4.45	4.9	4.7	4.8	4.8
Female Adults/Male	1.47	1.33	1.32	0.96	1.3	1.38	0.97	0.96	1.18	1.1	1.2
Children	2.69	1.63	2.82	2	2.3	2.15	1.72	2	2.29	2.1	2.2
Female headed HH	25%	19%	20%	17%	20%	28%	14%	17%	26%	21%	21%
Main Occupation of Head of Household											
Farmer	94%	94%	75%	100%	90%	95%	100%	100%	94%	97%	94%
No occupation	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Village Chairman	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Employee(Teacher,Secr..)	6%	6%	20%	0%	8%	5%	0%	0%	0%	1%	4%
Businessman	0%	0%	5%	0%	1%	0%	0%	0%	3%	1%	1%
Fundi	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Other	0%	0%	0%	0%	0%	0%	0%	0%	3%	1%	1%
Household Possessions in Working Order											
Kerosene Stove			15%		4%	5%	5%	9%	10%	7%	6%
Kerosene Lamp	94%	75%	95%	44%	77%	72%	27%	39%	19%	39%	53%
Radio	31%	44%	55%	6%	34%	39%	36%	17%	16%	26%	29%
Sewing Machine			15%		4%		0%	0%	0%	0%	2%
Tin Roof	44%	19%	40%	11%	29%	33%	36%	22%	0%	22%	24%
Main Source of Cash Income											
Sale of Agricultural Products	88%	87%	60%	89%	80%	61%	90%	96%	60%	77%	78%
Sale of Livestock	0%	0%	0%	5%	1%	0%	0%	4%	7%	3%	2%
Sale of Casul Labour in the Village	0%	0%	5%	0%	1%	6%	0%	0%	0%	1%	1%
Sale of Casul Labour outside the Village	0%	0%	5%	0%	1%	0%	0%	0%	3%	1%	1%
Regular Paid Employment	6%	7%	25%	0%	10%	0%	0%	0%	7%	2%	6%
Cash Remitted by Relatives	6%	0%	0%	0%	1%	6%	10%	0%	7%	5%	4%
Timber	0%	0%	0%	0%	0%	22%	0%	0%	0%	5%	2%
Artisan	0%	7%	5%	0%	3%	6%	0%	0%	3%	2%	2%
Trading	0%	0%	0%	5%	1%	0%	0%	0%	0%	0%	1%
Brewing	0%	0%	0%	0%	0%	0%	0%	0%	13%	3%	2%
Other	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Agricultural Production											
Fields											
Number of Plots	2.7	2.8	3	2.9	2.9	4.8	2	2.3	1.9	2.7	2.69
Total Size of Fields (acres)	6.8	7.7	7.1	8.8	7.6	8	10.1	6.9	7.7	8.1	7.92
Purchase of Fertiliser											
% HH purchasing fertiliser	25.0%	25.0%	10.0%	6.0%	16%	67.0%	82.0%	100%	87.0%	85%	56%
Purchase of Seeds											
% HH purchasing Seeds	31.0%	19.0%	40.0%	28.0%	30%	33.0%	9.0%	9.0%	32.0%	18%	25%
Harvesting of Crops											
Crops [t]	0.8	1.2	1.3	1	1.1	2.2	1.6	1.8	1.5	1.6	1.45
Crops transp. from Field [t]	5.6	7.5	6.6	6.1	6.4	18.3	8.2	8.6	3.7	6.5	7.77
Means of Transport											
% Walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Survey 1986/87	Unen- amwa	Madi- hani	Uten- gule	Kidope	Bulo- ngwa	Ihela	Mpan- gala	Ngoje	Ngo- nde	Mata- mba	Total
Marketing of agricultural Products											
Crops [kg]	139	195	179	128	159	182	678	558	239	465	305
Other Products [kg]	no data	no data	no data	no data	no data	no data	187	84	851	425	
Total Revenues from Marketing Activities											
All Products [\$ 1994]	no data	no data	no data	no data	no data	no data	77.02	116.00	70.92	87.06	54.60
Crops [\$ 1994]	23.85	26.50	25.11	32.98	27.19	21.73	73.81	114.27	49.33	76.47	49.33
% marketed in village	8%	46%	76%	87%	56%	48%	99%	88%	83%	89%	71%
% marketed externally	92%	54%	24%	13%	44%	52%	1%	12%	13%	9%	29%
Tkm	1.3	0.6	0.9	0.3	0.8	0.7	0.1	1.5	1.6	1.1	0.93
Means of Transport for Crop Marketing											
% by Walking	100%	100%	100%	100%	100%	86%	100%	100%	100%	100%	98%
% by Donkey						14%					
Transport Activities											
Water Collection											
Trips/annum	800	765	840	655	765.9	765	711	894	675	750	759
Distance [km]	2.48	1.32	2.32	1.6	2.0	3.32	1.08	1.92	1.8	1.6	1.95
Time/a [hours]	975	690	630	537	703.5	1329	440	926	639	664	754
kg/trip	18	15	18	15	16.6	18	18	18	18	18.0	17.41
Tonnes/annum	14.4	11.5	15.1	9.8	12.8	13.8	12.8	16.1	12.2	13.5	13.24
Tkm/annum	43.9	31.1	31.7	25.3	32.9	59.8	22	46.3	30.4	32.6	35.72
HH Walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Firewood Collection											
Trips/annum	140	200	165	210	178.1	205	166	135	114	136	161
Distance [km]	5.2	3.6	8.8	6.4	6.2	7.2	5.2	7.6	9.6	7.7	6.99
Time/a [hours]	222	140	353	501	313.2	404	279	372	521	404	366
kg/trip	25	25	25	25	24.9	25	25	25	25	25.3	25.09
Tonnes/annum	3.5	5	4.1	5.2	4.4	5.1	4.2	3.4	2.9	3.4	4.04
Tkm/annum	16.8	15.9	33.3	30.9	24.9	33.1	26.3	31.3	33.8	30.8	28.56
HH Walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Village centre (Village Office + Village shop)											
Trips/annum	257	145	148	162	178	145	93	94	73	85	131
Distance [km]	2.68	2.04	1.88	1.8	2.1	1.52	1.04	1.08	2.72	1.7	1.86
Time/a [hours]	345	148	140	146	194	110	48	51	99	70	126.3
HH walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Grinding Mill											
Trips/annum	36	27.6	42	61	42.3	43.2	43.4	35.5	46.2	42	42
Distance [km]	8.4	6.4	2	4.2	5.1	7.6	1.2	4.8	8.4	5.2	5.41
Time/a [hours]	164	67	31	77	83.4	174	24	86	192	110.2	105.97
kg/trip	20	20	20	20	20.0	20	20	23	26	23.3	21.50
Tonnes/annum	0.72	0.55	0.84	1.2	0.8	0.86	0.87	0.83	1.18	1.0	0.91
Tkm/annum	16.4	6.7	3.1	6.2	7.9	17.4	2.4	10.1	24.6	13.7	11.66
HH Walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	1.00

Survey 1986/87	Unen- amwa	Madi- hani	Uten- gule	Kidope	Bulo- ngwa	Ihela	Mpan- gala	Ngoje	Ngo- nde	Mata- mba	Total
Trips to the Fields											
Trips/annum	169	314	213	217	225	440	479	609	419	493	374
Distance [km]	5.6	4.8	4.4	4.8	4.9	6.4	4	4	2	3.2	4.26
Time/a [hours]	487	740	457	504	538	1409	964	1213	425	820	766
Tonnes/annum	0.8	1.2	1.3	1	1.1	2.2	1.6	1.8	1.5	1.6	1.45
Tkm/annum	5.6	7.5	6.6	6.1	6.4	18.3	8.2	8.6	3.7	6.5	7.77
HH Walking	100%	100%	100%	100%	100%	100%	100%	96%	100%	99%	0.99
HH using Donkeys								4%		1%	1%
Trips to MCH-Clinic											
Trips/annum	6.7	5.2	4.2	6	5.5	6.7	4.4	3.1	4.3	4.0	4.92
Distance [km]	9.6	6.8	2	6.8	6.2	7.6	3.2	1.6	2.8	2.6	4.63
HH walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Trips to Dispensary											
Trips/annum	21	18.4	31.8	12	21.1	10.7	9.3	17.2	17.3	14.9	17.04
Distance [km]	12	7.6	2	7.2	7.0	7.6	3.6	4	14	7.9	7.51
HH walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Trips to Hospital											
Trips/annum	2	2.4	0.9	1.1	1.5	2.4	0.1	0.6	1	0.6	1.20
Distance [km]	10	7.6	14.8	10	10.8	7.6	22.8	26.8	16	21.2	15.33
Time/a [hours]											
HH Walking	100%	100%	100%	88%	97%	100%	33%	73%	97%	71%	85%
HH using Bus							57%	27%		25%	12%
HH using Other Means of Transport				12%	3%				3%	1%	2%
All Health Facilities											
Trips/annum	30	26	37	19	28	20	14	21	23	19	23
Distance [km]	11	7	2	7	7	8	4	4	12	7	7
Time/a [hours]	167	98	42	80	94.7	69	26	40	126	70.6	80.55
Internal Crop Marketing											
Trips/annum	0.50	4.50	6.80	5.60	4.4	4.40	33.60	24.60	9.90	21.4	12.35
Distance [km]	3.2	3.7	1.9	2.7	2.8	2.4	1.6	2.0	4.5	2.9	2.81
Time/a [hours]	0.40	4.20	3.30	3.80	2.9	2.6	13.40	12.30	11.10	12.1	7.20
kg/trip	22.2	20.0	20.0	19.6	20.5	20.5	19.9	19.9	20.2	20.0	20.26
Tonnes/annum	0.01	0.09	0.14	0.11	0.1	0.09	0.67	0.49	0.20	0.4	0.25
Tkm/annum	0.02	0.21	0.20	0.19	0.2	0.14	1.30	1.20	1.10	1.2	0.64
External Crop Marketing											
Trips/annum	6.4	5.3	2.1	0.8	3.5	4.7	0.5	3.3	2.0	1.9	2.90
Distance [km]	16.4	9.9	34.1	25.5	22.3	11.7	7.2	17.2	31.2	19.9	19.99
Time/a [hours]	26.3	13.1	17.9	5.1	15.6	13.8	0.9	14.2	15.6	10.8	13.14
kg/trip	19.8	20.8	19.0	20.8	20.1	20.2	20.0	20.3	20.0		
Tonnes/annum	0.13	0.11	0.04	0.02	0.1	0.10	0.01	0.07	0.04	0.0	0.06
Tkm/annum	1.3	0.6	0.9	0.3	0.8	0.7	0.1	0.8	0.8	0.6	0.67

Survey 1986/87	Unen- amwa	Madi- hani	Uten- gule	Kidope	Bulo- ngwa	Ihela	Mpan- gala	Ngoje	Ngo- nde	Mata- mba	Total
Trips to 1. Market											
Trips/annum	25.8	32.7	39.4	23.3	30.4	35.6	52.1	79.5	63.1	64.6	47.0
Distance [km]	10.8	4.4	13.6	10.8	10.2	9.2	5.2	8	15.4	10.2	10.06
HH walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Trips to 2. Market											
Trips/annum	15	10	33	21	20	13	12	37	8	18	18
Distance [km]	8.0	21.6	23.6	14.4	17.0	16.0	13.2	9.2	11.2	11.2	14.16
HH walking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Total Trips to Markets											
Trips/annum	40	43	73	44	51	48	64	117	71	82	65
Time/a [hours]	206	199	597	153	299.6	310	144	283	534	343	321
Other Trips within District											
Trips/annum	12	69	42	32	38	31	30	106	12	45	41
Other Trips outside District											
Trips/annum	1.0	0.5	2.0	0.5	1.0	1.5	7.2	11.4	4.5	7.3	4.0
Total Transport Activities											
Trips/annum	1,492	1,600	1,570	1,407	1515	1,708	1,642	2,051	1,449	1684	1616
Time/annum	2,593	2,099	2,271	2,007	2244	3,821	1,939	2,998	2,563	2504	2540
Tonnes/annum	19.6	18.5	21.5	17.3	19.3	22.1	20.2	22.7	18.0	20.0	20.0
Tkm / annum	84.0	62.0	75.8	69.0	73.1	129.4	60.2	98.3	94.4	85.3	85.0

Source: BARWELL /MALMBERG 1989

Annual Transport Patterns of Households in Makete 1994

1994	Water	Fire- wood	Village centre	Grin- ding Mill	Fields	Health Facili- ties	Interna l Crop market.	Extern. Crop market.	Exter- nal Market	Other places	Total
Trips/annum	1055	276	206	36	235	25	11	20	91	34	1970
Distance [km]	1.6	5.3	1.6	3.7	3.6	6.5	-	-	9.2	-	-
Time/a [hours]	811	370	138	71	429	72	3.8	55	450	(93).	2346
Tonnes/annum	18.2	6.9	-	0.7	2.1	-	0	0.4	-	-	28.5
Tkm/annum	28.2	37.3	-	5.6	7.5	-	0.3	4.4	-	-	83.3
1986/87											
Trips/annum	759	161	131	42	374	23	12	3	65	45	1616
Distance [km]	1.9	7.0	1.9	5.4	4.3	7.1	2.8	20.0	-	-	-
Time/a [hours]	754	366	126	106	766	81	7	13	321	-	2540
Tonnes/annum	13.2	4.0	-	0.9	1.5	-	0.2	0.1	-	-	20.0
Tkm/annum	35.72	28.56	-	11.66	7.77	-	0.64	0.67	-	-	85.02
Absolute Changes since 1987											
Trips/annum	296	114	75	-6	-139	2	-1	17	26	-10	354
Distance [km]	-0.3	-1.7	-0.2	-1.7	-0.7	-0.6	-	-	-	-	-
Time/a [hours]	57	5	12	-35	-337	-8	-3	42	129	-	-195
Tonnes/annum	5	3	-	0	1	-	0.0	0	-	-	9
Tkm/annum	-7.5	8.7	-	-6.1	-0.2	-	-0.3	3.7	-	-	-1.7
Relative Changes since 1987											
Trips/annum	39%	71%	58%	-14%	-37%	7%	-12%	572%	39%	-23%	22%
Distance [km]	-16%	-24%	-12%	-32%	-16%	-9%	-	-	-	-	-
Time/a [hours]	8%	1%	9%	-33%	-44%	-10%	-48%	318%	40%	-	-8%
Tonnes/annum	37%	71%	-	-21%	44%	-	-12%	568%	-	-	43%
Tkm/annum	-21%	30%	-	-52%	-3%	-	-53%	559%	-	-	-2%

Traffic Survey Matamba-Chimala Road

Road traffic from Matamba to the Lowland

	Wednesday 15.6.94	Thursday 16.6.94	Friday 17.6.94	Saturday 18.6.94	Average
Trucks	8	6	3	5	6
Tractors	0	1	0	3	1
Four wheel drive	4	5	4	6	5
Total Motor Vehicles	12	12	7	14	11
Passengers	27	33	15	48	31
Potatoes [t]	0.0	1.0	0.0	8.5	2.4
Ulanzi [t]	10.1	9.6	6.0	9.5	8.8
Total Tonnes	10.1	10.6	5.98	18.02	11.2

Utengule - Ng'yekye Footpath

	Uphill			Downhill			Up and down		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
Thur 26 May 1994	19	20	39	20	76	96	39	96	135
Fri 27 May 1994	107	179	286	151	276	427	258	455	713
Sat 28 May 1994	24	25	49	11	19	30	35	44	79
Thur and Fri 1994	126	199	325	171	352	523	297	551	848
Total 1994	150	224	374	182	371	553	332	595	927
Wed 19 Oct 1988			9			20			29
Thur 20 Oct 1988			4			31			35
Fri 21 Oct 1988			160			210			370
Sat 22 Oct 1988			26			14			40
Mon 24 Oct 1988			14			8			22
Tue 25 Oct 1988			8			5			13
Thur and Fri 1988			164			241			405
Total 1988			221			288			509
Change Thur +Fri			98%			117%			109%

Madihani - Ng'yekye Footpath

	Uphill			Downhill			Up and down		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
Thur 26 May 1994	1	3	4	14	16	30	15	19	34
Fri 27 May 1994	76	123	199	80	97	177	156	220	376
Sat 28 May 1994	5	7	12	3	1	4	8	8	16
Thur and Fri	77	126	203	94	113	207	171	239	410
Total	82	133	215	97	114	211	179	247	426
Thur 20 Oct 1988			2			29			31
Fri 21 Oct 1988			66			134			200
Total			68			163			231
Change 1988-1994			199%			27%			77%

System Model Equations:

Income & Expenditure

$\text{Income}(t) = \text{Income}(t - dt) + (\text{Revenues} - \text{Disp_Income} - \text{Inputs}) * dt$

INIT Income = 73

INFLOWS:

$\text{Revenues} = \text{Other_Income} + \text{Net_Market_Revenue}$

OUTFLOWS:

$\text{Disp_Income} = \text{Income} - \text{Inputs}$

$\text{Inputs} = \text{Fertiliser} * 0.1345 + \text{Costs_IMT}$

$\text{Costs_IMT} = \text{Debt_Service} / 4180 + \text{Share_Bicycle} * 3.74 + \text{Share_Donkey} * 4.34$
 $+ (1 - \text{Credit_Level}) / \text{Credit_Level} * \text{Disbursement} / 4180$

$\text{Gross_Market_Revenue} = \text{Production} - 156$

$\text{Growth_Income} = \text{Income} / \text{delay}(\text{Income}, 1) * 100 - 100$

$\text{Net_Market_Revenue} = \text{Gross_Market_Revenue} - \text{Gross_Market_Revenue} / 76.34 * (1 - \text{Share_Internal})$
 $* \text{User_Charge} - \text{Gross_Market_Revenue} / 76.34 * (1 - \text{Share_Internal}) * \text{VOC}$

$\text{Other_Income} = 56.7 + \text{Imp_Income} + 0.1 * \text{delay}(\text{Disp_Income}, 1)$

Production

$\text{Fertiliser}(t) = \text{Fertiliser}(t - dt) + (\Delta_Fertiliser) * dt$

INIT Fertiliser = 1

INFLOWS:

$\Delta_Fertiliser = (\text{Net_Market_Revenue} * 0.1 / 0.1345 * \text{Diffusion_Faktor}$
 $- \text{delay}(\text{Net_Market_Revenue} * 0.1 / 0.1345 * \text{Diffusion_Faktor}, 1)) * \text{Imp_Fertilizer}$

$\text{Labour}(t) = \text{Labour}(t - dt) + (\Delta_Labour) * dt$

INIT Labour = $(164.72 / 9.294 / \text{Land}^{0.3724})^{(1 / 0.4404)} * 6$

INFLOWS:

$\Delta_Labour = 1 / 6 * \text{Diffusion_Faktor} * \text{Disposable_Time}$

$\text{Land}(t) = \text{Land}(t - dt) + (\text{Clear_Land}) * dt$

INIT Land = 4.355

INFLOWS:

$\text{Clear_Land} = \text{Labour} / 271 - \text{Land}$

$\text{Diffusion_Faktor} = \text{if}(\text{time} < 6) \text{ then } \text{time} / 6 \text{ else } 1$

$\text{Growth_Prod} = \text{production} / \text{delay}(\text{production}, 1) * 100 - 100$

$\text{Production} = 9.294 * \text{Land}^{0.3724} * \text{Fertiliser}^{0.0499} * (\text{Labour} / 6)^{0.4404}$
 $* (1 + \text{Share_Donkey} * 0.5654 + \text{Share_Bicycle} * 0.3352)$

Transport Sector

$\text{Dist_Field} = 0.14 * \text{Land} + 2.89$

$\text{Load} = \text{Share_Bicycle} * 0.04 * 0.4 + \text{Share_Donkey} * 0.06 * 0.8 + (1 - \text{Share_Bicycle} * 0.4 - \text{Share_Donkey} * 0.8) * 0.02$

$\text{Other_Time} = 1858 - \text{Imp_other_Time} - \text{Share_Bicycle} * 203$

$\text{Share_Internal} = 0.12 * \text{Disp_Income} / \text{Gross_Market_Revenue}$

$\text{Time_Fields} = \text{Labour} / 6 * \text{Dist_Field} * 2 / 4$

$\text{Time_Market} = \text{Tkm_Market} / \text{Load} / 2$

$\text{Tkm_Market} = \text{Gross_Market_Revenue} / 76.34 * (\text{Share_Internal} * 1.6 + (1 - \text{Share_Internal}) * \text{Dist_Mark})$

$\text{Trans_Time} = \text{Other_Time} + \text{Time_Market} + \text{Time_Fields}$

Time Budget

$\text{Disposable_Time}(t) = \text{Disposable_Time}(t - dt) + (- \Delta_Time) * dt$

INIT Disposable_Time = 5000 - Trans_Time - Labour

OUTFLOWS:

$\Delta_Time = \Delta_TransTime + \Delta_Labour$

$\Delta_TransTime = \text{Trans_Time} - \text{delay}(\text{Trans_Time}, 1)$

Credit System IMT

Credit System IMT

$Bicycles(t) = Bicycles(t - dt) + (Purchase_Bicycle - B_paid) * dt$

INIT Bicycles = 0

TRANSIT TIME = 5

ENTRANCE CAPACITY = ∞

INFLOWS:

$Purchase_Bicycle = IMT_Fund_Start * WTP_Bic * 2508 - delay(IMT_Fund_Start * WTP_Bic * 2508, 1) + Out_of_Order$

OUTFLOWS:

$B_paid = CONVEYOR_OUTFLOW$

$Bicycles_paid(t) = Bicycles_paid(t - dt) + (B_paid - Out_of_Order) * dt$

INIT Bicycles_paid = 0

TRANSIT TIME = 5

ENTRANCE CAPACITY = ∞

INFLOWS:

$B_paid = CONVEYOR_OUTFLOW$

OUTFLOWS:

$Out_of_Order = CONVEYOR_OUTFLOW$

$Donkeys(t) = Donkeys(t - dt) + (Purchase_Donkey - Dpaid) * dt$

INIT Donkeys = 0

TRANSIT TIME = 5

ENTRANCE CAPACITY = ∞

INFLOWS:

$Purchase_Donkey = IMT_Fund_Start * WTP_Donk * 1254 - delay(IMT_Fund_Start * WTP_Donk * 1254, 1) + Death$

OUTFLOWS:

$Dpaid = CONVEYOR_OUTFLOW$

$Donkeys_Paid(t) = Donkeys_Paid(t - dt) + (Dpaid - Death) * dt$

INIT Donkeys_Paid = 0

TRANSIT TIME = 5

ENTRANCE CAPACITY = ∞

INFLOWS:

$Dpaid = CONVEYOR_OUTFLOW$

OUTFLOWS:

$Death = CONVEYOR_OUTFLOW$

$IMT_Credit_Fund(t) = IMT_Credit_Fund(t - dt) + (Debt_Service - Disbursement) * dt$

INIT IMT_Credit_Fund = 0

INFLOWS:

$Debt_Service = delay((Donkeys * Annuity_Donk + Bicycles * Annuity_Bic) * 0.8, 1)$

OUTFLOWS:

$Disbursement = Purchase_Bicycle * Credit_Bic + Purchase_Donkey * Credit_Donk$

$Annuity_Bic = \text{If } (Credit_Level=0) \text{ then } 0 \text{ else}$

$\text{If } (Credit_Level=0.25) \text{ then } 5.13 \text{ else}$

$\text{If } (Credit_Level=0.5) \text{ then } 10.26 \text{ else}$

$\text{If } (Credit_Level=0.6) \text{ then } 12.32 \text{ else}$

$\text{If } (Credit_Level=0.7) \text{ then } 14.37 \text{ else}$

$\text{If } (Credit_Level=0.75) \text{ then } 15.4 \text{ else}$

$\text{If } (Credit_Level=0.8) \text{ then } 16.42 \text{ else}$

$\text{If } (Credit_Level=0.9) \text{ then } 18.48 \text{ else } 0$

$Annuity_Donk = \text{If } (Credit_Level=0) \text{ then } 0 \text{ else}$

$\text{If } (Credit_Level=0.25) \text{ then } 6.10 \text{ else}$

$\text{If } (Credit_Level=0.5) \text{ then } 12.21 \text{ else}$

$\text{If } (Credit_Level=0.6) \text{ then } 14.65 \text{ else}$

$\text{If } (Credit_Level=0.7) \text{ then } 17.09 \text{ else}$

$\text{If } (Credit_Level=0.75) \text{ then } 18.31 \text{ else}$

$\text{If } (Credit_Level=0.8) \text{ then } 19.53 \text{ else}$

$\text{If } (Credit_Level=0.9) \text{ then } 21.97 \text{ else } 0$

$Credit_Bic = Credit_Level * 74$

$Credit_Donk = Credit_Level * 88$

$Credit_Level = 0.75$

$Share_Bicycle = (Bicycles + Bicycles_paid) / 4180$

Share_Donkey = (Donkeys_Paid+Donkeys)/4180
 Share_IMT = Share_Bicycle+Share_Donkey
 Revenue_NonIMT = GRAPH(time)
 (0.00, 9.00), (1.00, 13.0), (2.00, 24.0), (3.00, 38.0), (4.00, 55.0), (5.00, 73.0), (6.00, 91.0), (7.00, 105), (8.00, 115), (9.00, 122), (10.0, 127), (11.0, 130), (12.0, 133), (13.0, 134), (14.0, 135), (15.0, 136), (16.0, 137), (17.0, 137), (18.0, 137), (19.0, 137), (20.0, 137)
 WTP_Bic = GRAPH((74-Credit_Bic)/Revenue_NonIMT)
 (0.00, 1.00), (0.05, 0.915), (0.1, 0.8), (0.15, 0.723), (0.2, 0.615), (0.25, 0.523), (0.3, 0.462), (0.35, 0.4), (0.4, 0.369), (0.45, 0.331), (0.5, 0.262), (0.55, 0.215), (0.6, 0.2), (0.65, 0.185), (0.7, 0.131), (0.75, 0.092), (0.8, 0.077), (0.85, 0.062), (0.9, 0.046), (0.95, 0.031), (1.00, 0.015)
 WTP_Donk = GRAPH((88-Credit_Donk)/Revenue_NonIMT)
 (0.00, 1.00), (0.05, 0.974), (0.1, 0.795), (0.15, 0.667), (0.2, 0.513), (0.25, 0.462), (0.3, 0.41), (0.35, 0.359), (0.4, 0.256), (0.45, 0.154), (0.5, 0.128), (0.55, 0.103), (0.6, 0.09), (0.65, 0.077), (0.7, 0.064), (0.75, 0.051), (0.8, 0.046), (0.85, 0.041), (0.9, 0.036), (0.95, 0.031), (1.00, 0.026)

Road Fund

Road_Fund(t) = Road_Fund(t - dt) + (Charges - Costs) * dt
 INIT Road_Fund = 0
 INFLOWS:
 Charges = Gross_Market_Revenue*4180/76.34*(1-Share_Internal)*User_Charge
 OUTFLOWS:
 Costs = Road_Investment + Road_Maintenance - Road_Fund*0.08

Scenarios

Dist_Mark = IF(scenario = 1) then 33.2 else
 If (Scenario = 2 or scenario = 4 or scenario = 5) then 9.5 else
 if (Scenario=3) then 1.6 else 0
 Imp_Fertilizer = if (Scenario = 1) then 0 else 1
 Imp_Income = if (scenario = 1 and time < 1) then 0.96 else
 if (Scenario= 1 and time >= 1) then 0.06 else
 If (Scenario = 2 and time < 1) then 17.36 else
 If (Scenario = 2 and time >= 1) then 0.99 else
 if (Scenario=3 and time < 1) then 36.5 else
 if (Scenario=3 and time >= 1) then 2.52 else
 if (Scenario=4 and time < 1) then 33.6 else
 if (Scenario=4 and time >= 1) then 1.06 else
 If (Scenario= 5 and time < 1) then 17.36 else
 If (Scenario= 5 and time >= 1) then 0.99 else 0
 Imp_other_Time = If (Scenario=4 and time >= 1) then 388 else 0
 IMT_Fund_Start = If (scenario=5) then 1 else 0
 Road_Investment = if (scenario=2 and time < 1) then 123019 else
 if (scenario=3 and time < 1) then 318075 else
 if (scenario=4 and time < 1) then 123019 else
 if (scenario=5 and time < 1) then 123019 else 0
 Road_Maintenance = if (scenario=2 and time >= 1) then 7013 else
 if (scenario=3 and time >= 1) then 18072 else
 if (scenario=4 and time >= 1) then 7013 else
 if (scenario=5 and time >= 1) then 7013 else 0
 Scenario = 5
 User_Charge = If (scenario = 2 and Charge_on = 1) then 4.01 else
 If (scenario = 3 and Charge_on = 1) then 9.27 else
 If (scenario = 4 and Charge_on = 1) then 3.42 else
 If (scenario = 5 and Charge_on = 1) then 2.58 else 0
 VOC = If (Scenario = 1 and time >= 1) then 0 else
 If (Scenario = 2 and time >= 1) then 15.18 else
 If (Scenario = 3 and time >= 1) then 19.15 else
 If (Scenario = 4 and time >= 1) then 15.18 else
 If (Scenario = 5 and time >= 1) then 15.18 else 0

Graphs & Tables

Charge_on = 0