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URBAN AGRICULTURE, FOOD SECURITY AND NUTRITION IN LOW INCOME AREAS OF THE CITY OF NAIROBI, KENYA

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Abstract **Accepted December, 1995**

This article discusses how far farming activities performed by low income dwellers within the City of Nairobi play a role in the food security and nutritional condition of the households involved A comparison is made between three low income groups, i e those who do practice urban farming, those who do not, and a group involved in an urban farming project The results show that as far as food security is concerned urban farming does play a prominent role, but this is not translated in a better nutritional condition of the young children

Résumé

Cet article traite de la mesure dans laquelle les activités agricoles pratiquées par les citadins de bas revenus, en deçá des limites de la ville de Nairobi, contribuent á la securité alimentaire et á la nutrition des ménages impliqués L'étude tisse une comparaison entre trois groupes a bas revenus ceux qui pratiquent l'agriculture urbaine, ceux qui ne la pratiquent point et un troisieme groupe, engage dans un projet d'agriculture urbaine Les résultats montrent que l'agriculture urbaine contribue à la securité alimentaire des ménages même si la condition nutritionnelle des jeunes enfants dans les ménages pratiquants n'est pas nettement supérieure a celle des enfants dans les ménages non-producteurs

Introduction

Until recently, urban agriculture—which can be defined as any farming technique in an urban environment (Maxwell and Zziwa, 1992b)—was believed to be an insignificant cultural practice carried over from the rural areas and was ignored by academics and planners Recent research, however, suggests that urban agriculture is potentially a livelihood-enhancing strategy for the low income urban dwellers (Sawio, 1993 59–82) Urban agriculture is usually an activity unplanned and uncontrolled by the state Apart from farming in backyards (mainly by those with some unused land space on their compounds) and farming in rural areas which became part of the urban area due to the expansion of the urban boundaries (Memon and Lee-Smith, 1993 25–42, term as 'urban farmers' these traditional landowners or farmers), it involves food production on idle and/or reserved land as a mode of survival by many low income urban people It is this latter type of urban agriculture that this article is concerned with

In East and Central Africa, urban farming has been practised since the late 1960s and early 1970s (Sawio, 1993 59–82) It has been officially recognised in Zambia but attempts to bar it surface from time to time (Sanyal, 1987 and Rakodi, 1985 53–61 and 1988 495–515) Studies carried out in this region reveal that a majority of the farmers are women of low socioeconomic class Urban agriculture tends to be a livelihood strategy to supplement their inadequate incomes by producing food on any available land (Sanyal, 1987, Rakodi, 1988 495–515, Drakakis-Smith, 1992 258–283 and Maxwell and Zziwa, 1992a 91–109) Crops produced include mainly vegetables and fruits plus some legumes and root crops (Mlozi et al , 1992 284–294 and Maxwell and Zziwa, 1992b) In Tanzania, milk and poultry have been reported to be produced in urban areas (Mlozi et al , 1992 284–294), while goats, rabbits and poultry have also been reported in Kampala, Uganda (Maxwell and Zziwa, 1992b) and Harare (Drakakis-Smith, 1992 258–283)

Farming within the City of Nairobi is not a new phenomenon except that its intensity increased in the late 1980s Food prices partly explained the rapid increase in the cultivation of open sites, backyards, river valleys, road and rail reserves in city and other urban areas in Kenya (Lee-Smith et al , 1987) Freeman (1991) observed that farmers growing crops had curved out irregular boundaries for their plots depending on who came first Some operated on public land leased to them by 'landlords' at a rent as high as Ksh 1,000 per annum (Gathuru, 1988) Another study revealed that the majority of such farmers are women, very poor, landless and subsistence dwellers while farming at the backyard of residential houses is a characteristic of a few middle and upper socioeconomic groups as these can afford housing with unused land space (Lado, 1990 257–266) A survey carried out in Kiambu District, Kenya indicated that such factors as family size, landlessness, unemployment and the need to grow food crops for domestic consumption and for sale to obtain a cash income motivated farmers (mainly females) to encroach on roadside reserves as a means of sustaining their livelihoods (Mutisya and Lado, 1991 107–127)

Most studies pointed at problems of land tenure for the poor urban farmers They 'illegally' farm on land that does not belong to them hence they are faced with problems of crop and/or livestock insecurity In the general survey on urban agriculture in Kenya carried in 1985 by Lee-Smith et al (1987), 6 percent of the urban farmers mentioned to have experienced eviction from their plots by the landowner or municipality In the City of Nairobi, this applied to only 3 percent of the respondents

Until now, very few studies focused on the food consumption and/or nutritional condition of poor urban dwellers Alarcon and Rivera (1994 171–182), studying the impact of changes in purchasing power on food consumption of an urban population in Guatemala City found that the mean energy intake for households with the lowest incomes ranged from 70 percent to 78 percent of the requirements and protein intake from 92 percent to 106 percent of the recommended level Atuanya (1987 109–127) carried out a dietary survey of the urban poor in Benin City, Nigeria and found that, on average, daily individual calorie intake was about 75 percent of the requirements and the average protein intake was also less than the recommended safe level

The potential contribution of urban agriculture to the food supply of the urban population, in particular the urban poor who practice it as a survival strategy, is revealed in various studies Sachs and Silk (1990) cited a number of studies that highlight the importance of urban agriculture in several countries For instance, urban agriculture has been shown to improve vitamin A levels in diets in many Asian countries, such as Indonesia (Yeung, 1987 14–23) In some small urban gardening projects such as in Argentina, high yields were obtained, while livestock could be fed with the waste from the gardens (Wade, 1987 29–35)

Several surveys conducted in 1990–1992 in low income areas of the City of Nairobi revealed that malnutrition among young children was quite common The prevalence of wasting among children aged 6–60 months ranged from 5 percent to 13 percent (the national rural figure in 1987 being 2 5 percent) and stunting from 10 percent to 57 percent (19 6 percent in Kenya as a whole, Kenya, 1991) In 1992, the level of wasting in Kawangware, a low income area in the southwest of the City of Nairobi was 8 3 percent (Kenya/UNICEF, 1992)

Past studies on urban agriculture in Kenya have concentrated either on the urban agricultural activities of the urban population in general, i e in all segments of the urban population (Lee Smith et al , 1987) or on urban producers only (Lado, 1990 257–266 and Freeman, 1991) The latter studies focused on the characteristics of the producers (i e household and/or individual characteristics) and of the agricultural activities (i e , types of crops, destination of the produce and land security, among others) A more recent study in Kibera (a slum settlement in the City of Nairobi) by Dennery (1995) focused on factors affecting the decisions and actions of urban farmers Little is known, however, about (a) the extent to which urban agriculture as a food source contributes to household food security, consumption and nutritional status among low income urban populations, and (b) how the low income urban farmers compare with their non-farming counterparts in this respect The present article tries to bridge this gap and contributes to the existing knowledge concerning urban agriculture in the City of Nairobi in at least three ways (a) it focuses on low income households only, (b) it compares households engaged in urban agriculture with households not performing any type of agriculture within the urban boundaries, and (c) it includes a group of households taking part in a special urban agriculture programme

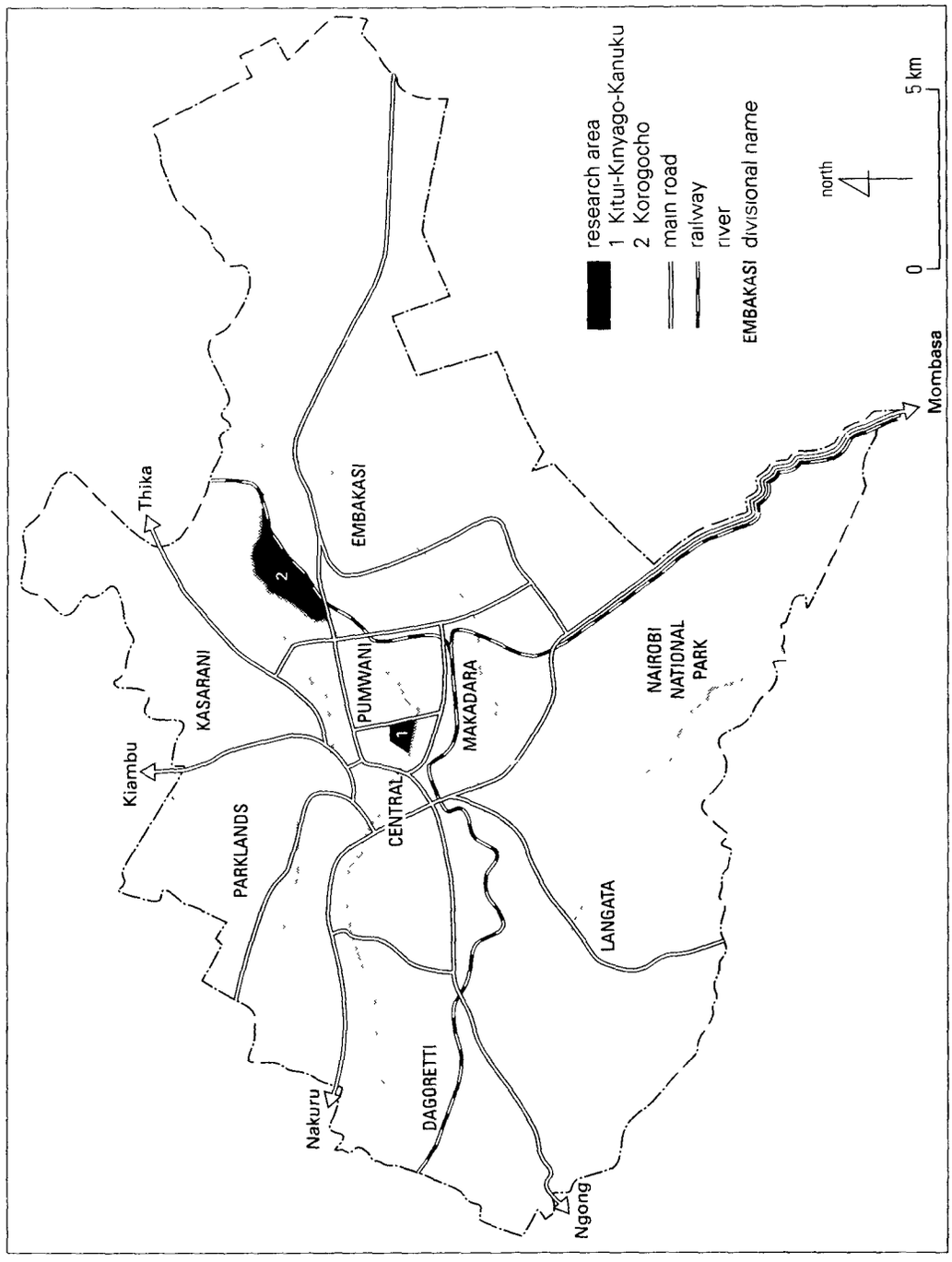
Study Areas

The study was conducted in the City of Nairobi and covered two cluster areas that had already been identified with poverty Korogocho and the Kitui-Kanuku-Kinyago area (figure 1) Korogocho area was intentionally selected from a list of already identified poor urban zones in the City of Nairobi Its selection was based on the fact that there was an adequate number of households practising urban agriculture It served as a typical low income area without any agricultural influence from Nongovermental Organisations (NGOs) and its agricultural activities were purely self initiated The area is located about eight kilometres from the urban centre, towards the northeast Its population was estimated at 75,000 in 1990 (World Vision International, 1990) Among the poor districts of the City of Nairobi, Korogocho has been shown to have the lowest monthly income per household head (Kenya/UNICEF, 1990)

The Kitui Kanuku Kinyago area is situated three kilometres from the city centre The combined villages were estimated to have 10,000 households with more than 40,000 people living there These were the villages involved in the so called Undugu Society Urban Agriculture Project (USUAP) The USUAP is part of a wider project on slum development and organised by the Undugu Society of Kenya (USK) for 'underprivileged' people living in the low income areas The USK started as a small parking boys (street boys) scheme launched in 1975/76 It has now developed into an extensive low income development project The USUAP started in 1988 and its aim was to provide household level food security for the households involved The initial target areas were the three slum villages Kitui-Pumwani, Kanuku and Kinyango located on the eastern side of the City of Nairobi Plots with a size of 165 square metres (3 x 55 m) along the Nairobi River were allocated through the local government to 105 low income households The individuals were given agricultural result demonstrations and assistance on the plots for a period of two years and left to continue on their own with only technical advice from the USK The technologies offered were mainly biointensive including organic manure composting and pesticide formulation (Personal communication, 1993) Crops grown were meant to be mainly vegetables for consumption and the surplus for sale

The Korogocho area provided two types of households, namely, low income urban households practising self initiated urban farming activities (the so called Korogocho farmers') and households not practising any urban farming (the 'Korogocho non farmers') Three villages were randomly selected from a total of seven villages and all the households in these villages were listed It was found that 30 percent of the households could be classified as urban farmers From both 'farmers' and 'non farmers' 70 households were randomly selected From the Kitui-Kanuku Kinyago households involved in the USUAP, another 70 households were randomly selected (the so called USUAP farmers') During the analysis it appeared that some households from the Korogocho farming group had to be dropped because it

Figure 1, The city of Nairobi, Kenya, showing the research area



Map1 Nairobi *Source* Matrix Development Consultants, 1993

was found that some of them had only a few poultry (less than 5) and did not practice any form of urban cultivation. Due to this and to unreliable responses, the final number of households involved were 48 Korogocho farmers, 67 Korogocho non-farmers and 62 USUAP farmers.

Data were collected with the use of an interviewer-administered questionnaire and the head's wife or the female head in the household as the main respondent (the male household head was required to respond whenever necessary). The head's wife or female head was selected as respondent because she is usually responsible for food production and preparation; hence, she is the best respondent especially where household food preparation and consumption issues are at stake.

Demographic Characteristics

Table 1 shows some selected demographic characteristics of the three study groups. In general, the non-farmers households appear to be less far in the 'family life cycle': households are smaller, household heads are younger and there are more young children. Moreover and probably related to this, most of the heads in this group arrived later in the City of Nairobi than the heads in the two farming groups, one-third of them after 1986. This in itself may be one of the reasons for not having access to land: they came at a time when a lot of potential farming land was already occupied while in general they are less 'settled' in the city than those who stayed longer. As far as the educational level of the household heads is concerned, the highest level was found among the Korogocho non-farmers as the large majority of them had at least upper primary school level of education. The female heads among the non-farmers were also better educated than the rest since 14 percent of them had attained post-primary school education compared to 5 percent among the urban farming households. Even though the (few) heads with post-secondary school education were all found in the USUAP group, one-third of the heads in this group had received no education at all.

There appeared to be a distinct ethnic clustering among the groups. Most of the inhabitants of the USUAP villages are Kikuyu (90 percent) who have been in the City of Nairobi for a longer time than their Korogocho counterparts. The Korogocho farming group consisted for about half of Kikuyu, one-third of Luo and the rest of other ethnic groups such as Luhya, Akamba and Somali. Among the Korogocho non-farmers, however, the Luo dominated (60 percent) while the Kikuyu formed the largest minority (30 percent). Although the ability to acquire urban land for farming seems to be influenced by the length of stay in the city, even those who may not have stayed in the city for a long time may acquire plots through ethnic acquaintances. On certain occasions in the Korogocho fields, it was said that if a Kikuyu wanted to stop tilling a certain plot, it would be 'sold' to somebody of the same ethnic group as the incoming farmer. If in any case the plot was passed on to somebody of different ethnicity, sometimes the new individual would be phased out by those farming the surrounding plots by 'digging into the plot' from all sides. Although this is not representative of all the farmers, it has some bearing as to why mostly Kikuyu are urban farmers. A Luo non-farmer in Korogocho complained to have been phased out in this manner.

Household Resources

In all groups, most household members were involved in informal trade and food selling (table 2). This consisted of street hawking and kiosk and market selling of raw and cooked foods, new and second hand clothes, other household items, collecting and selling of urban waste for recycling (e.g. waste paper, empty bottles, old plastics and shoe soles, among others) and shoe repair. Among the Korogocho groups, casual labour was the second important activity. Few household members had found employment in the formal sector, especially in the non-farmers' group (and despite their comparatively high level of education). Most formally employed persons were from the USUAP group, although no more than one-quarter of the adult population. Informal manufacturing (carpentry, metalwork and handicraft) and illegal trade and practices were more common among the non-farmers as compared to the farmers. Illegal trade and practices included activities like manufacture and selling of alcoholic brews, prostitution, street begging and stealing. Finally, urban farming was also mentioned as a source of income, especially in the Korogocho farming households. For the USUAP households, urban farming was quite marginal as an income source.

Using the monetary income generated from activities in which household members were involved in 1993, a rough estimation of the average monthly household income could be made. The kind of income-generating activities the household members were practising were not very rewarding. The large majority (85 percent) of the individuals earning a cash income in 1993 had an average monthly income of less

Table 1, Demographic Characteristics by Study Group

(N=)	Korogocho farmers (48)	Korogocho non-farmers (67)	USUAP farmers (62)
• average household size (no. of persons)	6.9	5.6	6.8
• average age of household head (years)	39	32	45
• no. of hh. members younger than 5 years	1.3	1.7	1.0
• % hh. heads born outside Nairobi	90	78	73
• % hh. heads at least 15 years in Nairobi*	63	39	85
•% hh. heads with at least mid-primary school	69	85	49

* Only those born outside Nairobi
Source: Supplied by the authors

than Ksh. 3,000. Only such activities as illegal alcohol brewing and selling, trading in used clothes and informal manufacturing seemed to be more promising, but few people had an income out of that. As a result, the average household income was also low. However, the groups differed substantially in this respect: with about Ksh. 2,700, the average monthly income in the USUAP group was almost 40 percent higher than in the Korogocho groups (about Ksh. 2,000). A look at the income distribution shows that the percentage of households with very low incomes, i.e. below Ksh. 2,500 per month was by far the highest among the non-farmers (table 2).

Since income is usually not reliably estimated, a very simple welfare index was developed by means of the ownership of certain items which appeared to have a discriminative value.[1] Table 2 shows that particularly among the non-farmers the percentage of households with a low welfare index was very high indeed.

The average size of the urban plot(s) was quite modest (table 2). The Korogocho farmers cultivated an area of on average 3,200 square metres (0.4 acres) while the plot size of the USUAP farmers was less than half of that. In addition, many households claimed to have access to land in the rural areas. This applied particularly to the non-farmers. At the same time, however, for two-thirds of the latter, the rural plot(s) formed neither a food nor an income source. This is likely related to the fact that most non-farmers originated from the area around Lake Victoria, i.e. too far from Nairobi to be able to exploit the land.

Urban Farming Activities

All urban farmers in both groups except one in the Korogocho group practised urban farming because they were in need of food. About one third of the farmers indicated that they also needed income. This indicates that urban poor households produced mainly for home consumption. Hence, crops grown were predominantly the basic foodstuffs like maize and beans, a finding comparable with that of Lee-Smith et al. (1987) 10 years earlier. An important vegetable concerned kale (*sukuma wiki)* which is usually consumed together with *ugali*, a thick paste made from maizemeal. Potatoes and arrowroot also appeared to be important crops. For all the crops grown, most of the produce was consumed at home; in other words, urban agriculture may be said to be mainly for own consumption. This, again, is in line with the finding of Lee-Smith et al. (1987) that 90 percent of the City of Nairobi urban farmers consumed the crops they produced while only 21 percent sold any part of their produce.

Livestock rearing did not appear to be important. Only a few individuals had some cattle, sheep and goats, poultry and rabbits mainly for home consumption. The major hindrance was the lack of space for keeping animals. Housing units were so squeezed together that there was no space for even children to play, leave alone keeping livestock. Ten years ago, the same pattern was found: 7 percent of the City of Nairobi households reared some livestock and the major constraint was also lack of access to land space (Lee-Smith et al., 1987).

Despite the urban agriculture project launched by the USK, the use of modern inputs among the USUAP farmers was less common than among the Korogocho farmers. There was more use of chemical fertiliser, improved seeds/seedlings, improved breeds and use of feed supplements in Korogocho. Use of natural pesticides was more common in the USUAP group. This may be because the USK advocates a bio-intensive kind of agriculture (i.e. where urban waste is recycled and used as fertiliser, pesticides and even as seedlings). Another reason may be, as Lee-Smith et al. (1987) point out, that many urban plots are too small to justify use of modern inputs. In their study, most of the farmers who used inputs tended to have larger plots than those who did not.

The major problem faced by urban farmers was theft (besides such problems as pests and diseases, lack of capital, and 'plots used as toilets', particularly in the USUAP areas). General discussions revealed that a substantial proportion of the maize and beans were harvested and consumed or sold before they were fully mature to avoid loss through theft. Thus, theft is very important in that it forces the cultivators to harvest crops with low caloric value. This finding contrasted with that of Lee-Smith et al. (1987), where the most important problem was that the crops were destroyed by animals. The explanation for this may be that at the time (mid-1980s) Lee-Smith and her colleagues carried out their study, the economic situation in Kenya was more stable and better. The recent declining economic situation in Kenya may have escalated the problem of poverty and hunger in the urban areas such that the problem of theft has outgrown the problem of animals destroying the crops. Eviction, like in Lee-Smith et al.'s (1987) study, did not appear to be a major problem.

Table 2, Household Resources by Study Group

(N=)	Korogocho farmers (48)	Korogocho non-farmers (67)	USUAP farmers (62)
• % persons with formal employment	15	6	24
• % persons doing casual labour	58	43	19
• % persons doing informal trade & food selling	60	45	86
• % hhs with monthly income below Ksh 2,500	31	60	34
• % hhs with low welfare index*	69	90	57
• average size urban plot(s) (sq metres)	3,200	–	1,400
• % hhs with access to rural land	50	75	40

* Based on the ownership of certain items (see footnote 1 and Mboganie 1995 72)
Source Compiled by the authors

Food Security

To get a general impression of the level of food security as perceived by the three categories of households, several general questions regarding food availability were asked. Table 3 gives a summary. It is clear that the food situation of the USUAP farming group was generally better than that of the two Korogocho groups. Asked how they coped with food shortages, almost half of the USUAP farmers claimed that they never experienced drastic food shortages to warrant a change of behaviour. For those USUAP households who did face food problems, the most important strategy was buying food on credit implying that they were optimistic about obtaining some monetary income later on to pay the debts. The Korogocho farmers employed a wide range of strategies. The non-farmers, however, had to rely mainly on such poverty-indicating strategies as going for donations and hawking.

In all three groups, purchased food formed by far the most important food source (table 3). Nevertheless, one-quarter of the Korogocho farmers indicated that their own farming activities within the urban boundaries comprised their main food source. For the USUAP group, this percentage was lower, which can undoubtedly be related to the smaller plots they have at their disposal.

Food Consumption

The actual food consumption in each household was recorded for the whole week prior to the day of the interview. Since most of the interviewing took place in July and August of 1994, the data give a fairly accurate picture of the actual food consumption during these two months. Since food ingredients differ in their nutrient composition (i.e., water content, energy content, mineral content and protein content among others), they are converted into nutrient equivalents for assessment of the quantity of nutrients consumed. In addition, household nutrient requirements vary since households differ in size, sex and age distribution and other factors that influence their nutritional needs. Therefore, for analysis of survey findings, household size is standardised in terms of the number of consumer units. Thus below, the foods consumed are expressed in kilocalories of energy and grams of protein per consumer unit per day.[2]

On average, all three groups had inadequate energy intake (table 4). Average kilocaloric intake was less than 75 percent of the estimated requirements. Average protein intake, on the other hand, seemed to be adequate for all groups.[3] These results are comparable with those found in other urban centres in developing countries (Alarcon and Rivera, 1994: 171–182 and Atuanya, 1987: 109–127). The finding that average energy intake is below and average protein intake is above the recommended level should not be a surprise since other studies, especially among the rural poor, have revealed the same pattern (see for example Foeken and Tellegen, 1992 and Hoorweg et al., 1991).

Although energy intake among all three groups was inadequate, differences were observed between the groups in the sense that the energy and protein intakes in the USUAP group were higher than in the other two groups.[4] And as far as protein intake is concerned, the proportion of households consuming less than the recommended safe level was highest in the non-farming group and lowest in the USUAP households.

Table 3, General Food Security Issues by Study Group in Percentages

(N=)	Korogocho farmers (48)	Korogocho non-farmers (67)	USUAP farmers (62)
• "Always or most of the time enough to eat"	35	25	71
• "Do not require any improvement in food situation"	13	6	27
• "Go for food donations or hawking during food shortage"	31	66	24
• "Most important food source during past 3 years"			
- purchased food	67	82	68
- own urban production	25	–	16

Source Compiled by the authors

Table 4, Estimated Daily Energy and Protein Intake Per Consumer Unit by Study Group

(N=)	Korogocho farmers (48)	Korogocho non-farmers (67)	USUAP farmers (62)
• Average household size in consumer units (cu)	4.8	3.7	4.3
Energy intake			
• Average intake (kcal/cu/day)	1,904	1,804	2,151
• % of requirements*	64	61	73
• % hhs with intake <75% of requirements*	70	67	64
Protein intake			
• Average intake (grams/cu/day)	62	61	66
• % of recommended level*	123	122	132
• % hhs with intake <75% of recommended level*	22	30	18

* Energy requirements are estimated at 2,960 kcal/day per consumer unit A safe level of protein intake is estimated at 50 grams per consumer unit per day (for calculation, see Mboganie 1995, Appendix 5)

Source Compiled by the authors

For all ingredients consumed during the week under investigation, the source was asked for, i.e. purchased, from own urban farming or from donations by others. The results are shown in table 5. For all groups, purchased food was by far the most important source of energy. Nevertheless, differences between the study groups regarding the proportion of purchased energy and protein consumed could be observed. Energy intake among the Korogocho farmers was 100 kcal per consumer unit per day higher than among the non-farmers despite lower purchases in the farmer group. Since the absolute level of food given to them by others was the same, the conclusion seems justified that this higher energy intake was the result of the Korogocho farmers' own production. The same applied to the intake of proteins. In addition, it was seen earlier that the Korogocho farmers seemed to be better off in material ownership although their monetary income was about the same. This again could be attributed to the fact that if people produce their own food, they spend less income on food and use it for other needs. In other words, for the Korogocho farmers, urban agriculture appears to be beneficial in two ways; directly because of a greater energy and protein intake and indirectly because it enables them to spend less money on food (at least during a given period of the year since the data collected apply to a relatively short period only).

The higher energy (and protein) intake in the USUAP households compared with Korogocho farmers and non-farmers cannot be explained in the same way. The absolute levels of own-produced energy and proteins in the former group were much lower. It appears that the higher energy and protein consumption among the USUAP farmers was mainly caused by the fact that they purchased more food, which is obviously related to their higher welfare level.

Table 5, Origin of Energy Intake by Study Group (kcal/cu/day)

(N=)	Korogocho farmers (48)	Korogocho non-farmers (67)	USUAP farmers (62)
• From own urban production	263	–	110
• Given by others	102	96	53
• Purchased	1,539	1,707	1,987
Total	1,904	1,804	2,151

Source: Compiled by the authors.

Nutritional Condition of Young Children

Anthropometric measurements of children aged between 6 and 60 months—generally considered as the most vulnerable group in terms of nutritional condition—were expressed as weight-for-age (WA), height-for-age (HA) and weight-for-height (WH).[5] The WHO (1983) reference values were used to determine the nutritional status of the children. The HA values of less than 90 percent of the reference value were generally regarded as evidence of stunting while the WH values of <80 percent of reference value were regarded as evidence of wasting. The WA values of <80 percent of reference value were regarded as generally malnourished and those with <60 percent were regarded as severely malnourished. The results are shown in table 6. The average WA, WH and HA in all groups were above the cut-off points. However, there appeared to be a trend similar to that in food consumption. Average WA and WH among the Korogocho non-farmers was lower and average HA among the USUAP farmers was higher.[6]

The differences between the groups are more pronounced when the proportions of malnourished, wasted and stunted children are considered. Using any of these indicators showed that the nutritional status of the children in the non-farming households was the worst and in the USUAP households the best. And although the difference between the proportion of underweight children among Korogocho farmers and among non-farmers was small, the fact that 5 percent of the children among the non-farmers were severely malnourished gives the farmers a better stand. The observed prevalence of malnutrition was within the range found in the earlier mentioned surveys conducted in 1990–1992 in low income areas of the City of Nairobi. The high level of wasting among the Korogocho farmers' children was the same as that found in the low income area of Kawangware in 1992.

Despite these general observations regarding the nutritional condition of the young children in the three study groups, it should be stressed that when looking only at the HA data (i.e. at the long-term nutritional status of the children), the difference between the Korogocho farmers and the Korogocho non-farmers is negligible: average HA is the same, while in both groups the prevalence of stunting is very high. Since the levels of energy intake do not show a big difference either and the levels of income are the same, one

Table 6, Nutritional Condition of Children Aged 6–60 Months

(N=)	Korogocho farmers (35)	Korogocho non-farmers (84)	USUAP farmers (30)
Weight-for-age (WA)			
• average*	85.7 (14.5)	83.7 (14.9)	87.0 (11.2)
• % malnourished (WA<80%)	37	42	27
• % severely malnourished (WA<60%)	–	4.8	–
Weight-for-height (WH)			
• average*	96.3 (10.6)	94.0 (11.0)	94.1 (7.8)
• % wasted (WH<80%)	2.9	8.3	–
Height-for-age (HA)			
• average*	92.5 (5.5)	92.6 (7.8)	95.3 (4.9)
• % stunted (HA<90%)	31	38	17

* Standard deviations in parentheses.
Source: Compiled by the authors.

is inclined to conclude that the advantage the Korogocho farmers have regarding their food supply—in terms of having to buy less food than the Korogocho non-farmers—is not translated into a better long-term nutritional condition, but in a higher material welfare level

Conclusion

In general, low income households in the City of Nairobi are unable to adequately feed themselves on their earnings Hence, many of them try to supplement their food supply by growing subsistence food However, for many of these households this option is out of reach because of the lack of access to urban land Unlike the middle and upper income groups (who can very easily feed themselves on their earnings), the low income groups have no backyards The high densities and overcrowded conditions they live in do not leave them with space to cultivate and/or to keep livestock They are, therefore, more often found farming vacant public or private land without any form of security The plots are too small, however, and the farmers may have to move from one plot to another once the rightful owners decide to develop them

The study indicates that the length of stay in the city plays a role as far as purchasing power and food security of the low income households are concerned The longer the households have been in the city, the more possibly they establish ways and means of obtaining income and food for survival. For instance, they may acquire formal employment, land to cultivate and may establish reasonable income-generating activities It is conspicuous that education seems to play no role (anymore) in this since the best educated group (the non-farmers) was also the group with the lowest percentage of persons in formal employment and with no access to urban land

Compared with the non-farmers, the Korogocho farming households were somewhat better off in terms of food security and, be it to a lesser extent, of nutritional status Their urban farming activities contributed to this in the sense that the self-produced food was mainly meant for home consumption In addition, it enabled these households to spend less money on food purchases and more on other daily needs, resulting in generally better living conditions than among the non-farmers In short, in explaining the somewhat higher livelihood level of the Korogocho farmers as compared with the Korogocho non-farmers, urban agriculture certainly plays a role

The households practising urban agriculture with assistance from USUAP had a higher level of food security and a better nutritional condition than those farming on their own initiative They appeared to have a more diversified kind of farming and sold more of their produce However, due to their very small plots their level of food production was quite low Apart from food production, these households also benefitted from other income-generating activities as well as the shelter improvement project that came along with the urban agriculture project Hence, their living conditions were better and they had a higher purchasing power compared to the non-farmers and the farmers not involved in any project It could be shown, however, that their higher livelihood level was not due to their urban farming practices

The urban planning policies and laws governing land acquisition in Kenya do not take urban farming into account Generally, it is not legal to practice urban farming according to the bylaws, although it is tolerated to some extent However, noting that these urban farmers rely on rainfall, have no technical agricultural and livestock keeping advice and are faced with problems of theft of crops, it appears that there is more potential in terms of food production through urban agriculture than what the results of the present study may suggest The Government of Kenya policies need to be reconsidered in the light of the hardship to the low income urban households Because there appears to be great potential in urban agriculture for the purpose of improving food availability and reducing the problem of malnutrition among the poor urban populations, policies of 'allotments' which have been used and succeeded in European countries and Malawi in encouraging urban agriculture could be reviewed and modified for adoption in Kenya This would assure rights like to agricultural extension services for high yields and advice on what to grow where Of course there is the issue of safety of the produce for human consumption but this can be controlled by the Government of Kenya taking more control over use of urban waste, environmental management and what land should be used for food production in collaboration with the communities and any other organisations However, there is need for further research into the quality and improvement of urban food and livestock production

Notes

1 The items used were radio, sofa set and bicycle Households received a score of 1 for the ownership of any of these items and a score of zero for not owning the item The scores were summed up so that the lowest score was zero and the highest score was 3 The distribution of the households is shown in Mboganie (1995 72) Households scoring below 2 were considered to have a low welfare index and to be 'very poor'

2 One consumer unit (cu) is the consumption equivalent (here in terms of required energy) of a nominal adult male The required energy of all household members is derived from this and depends on such factors as age, sex, physiological status and physical activity level (see Mboganie 1995 Appendix 2) Data on all foods consumed, harvested purchased and received as gifts were translated into kilograms of edible portions and into kilocalories and grams of protein per consumer unit, using *Food Composition Tables for Foods Commonly Eaten in East Africa (Nairobi Clive E West 1987)* Technical Centre for Agriculture and Rural Development and Food and Nutrition Cooperation Programme of East, Central and Southern Africa (1987)

3 To ensure that the results were not influenced by income outliers, two additional analyses of energy and protein intake as well as nutritional condition (see below) were done, one by using only the households with a monthly income of less than Ksh 2,500 and one with only the households with a low welfare index (for details, see Mboganie 1995 Appendix 4) In both cases, the results showed the same trends Hence the original results are presented here

[4] It has been shown that there is a negative relationship between household size and energy intake per consumer unit, i.e. the larger the household the lower the energy intake (see e.g. Niemeijer, Foeken and Klaver, 1991:35–36). If the figures in table 4 would be corrected for household size, however, the major result would be that the energy intake in the non-farmers households would be even lower.

[5] *Height-for-age* (HA) expresses the height of a child as a percentage of the corresponding median height of children of the same age in the reference population. The HA values of less than 90 percent are generally regarded as evidence of stunting, indicating that the child has failed to grow satisfactorily during lengthy periods in the past. Therefore, HA is commonly regarded as an indicator of nutritional history reflecting social and economic conditions. *Weight-for-height* (WH) expresses the weight of a child as a percentage of the corresponding median weight of children of the similar height in the reference population. The Weight-for-height (WH) values of below 80/85 percent can be regarded as evidence of wasting, indicating acute malnutrition. In this report, value of 80 percent is used. Weight-for-height (WH) is an indicator of present nutritional status. The weight of a child can also be expressed in terms of *Weight-for-age* (WA), often used as a 'short-cut measure' because it reflects both previous growth and present nutritional condition. It is used for a broad classification of malnutrition. Children with less than 60 percent of the reference weight for their age are generally regarded as severely malnourished while those with a WA between 60 percent and 80 percent as malnourished.

[6] Usually the averages are influenced by the age distribution of the children. Children aged 1–2 years usually tend to have a poor nutritional status compared to the rest due to the effect of weaning. For purposes of verification, the results were corrected for age distribution in each group but the trend was even more magnified. The original results are therefore presented.

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