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SANITATION AND WATER FOR ALL

Basic infrastructure in informal settlements in Kenya

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THE DATA ON which this paper is based are drawn from research work carried out by the author for a doctoral thesis. A primary objective of the study was to provide insight into the state of housing and infrastructure in urban low-income informal settlements in Kenya, and the inhabitants' appraisive perceptions of their environment. Some of the information has been used to rate the access by owner and tenant households in two informal settlements to basic infrastructure and their levels of satisfaction with the services to which they have access. Since the residents have direct experience of the deficient basic infrastructure that characterizes their environmental circumstances, their assessment of the (in)adequacy of the services can provide valuable information for improving service delivery through upgrading interventions. Even if the subjectivity and imperfect information underlying user ratings is conceded, there is no gainsaying that residents' perceptions do matter, especially when unambiguous patterns become apparent from an analysis of the experience of numerous households. When users identify specific aspects of services as problematic, the feedback offers pointers to infrastructure agencies to further investigate and address them through apposite measures (Paul and Sekhar, 1997).

Conducted in 1995, the studies discussed in this paper covered two informal settlements in two secondary towns in Kenya: Swahili Village in Machakos and Bondeni in Nakuru. Though not representative of all informal settlements in Kenya, the settlements were drawn from one of the main typologies of urban low-income informal settlements in Kenya—*majengos*.

The key questions behind the present evaluation are: Do owner and tenant households in the two *majengos* have equal access to basic infrastructure? How do householders rate the basic infrastructure components to which they have access?

On-plot services

Settlement upgrading aims to redress a deficiency of past public investment in basic infrastructure and services by a single intervention (UNCHS, 1996). While upgrading programmes differ in terms of objectives and components, a majority of policy packages are derivatives of the global technocratic paradigm of recommended action for settlement improvement—municipal service extension, tenure security, cost recovery, socioeconomic motivation and community participation (Baross, 1983).

The physical elements in the upgrading project implemented in Bondeni included the provision of a sanitary unit (comprising a tap, cistern-flush toilet and shower) on each of the plots in the project area, the construction of profiled and compacted earth roads and unlined stormwater drains, the provision of communal solid waste collection facilities, and erection of street lights.

Table 1. Availability of services on plot (percentage frequencies rounded)

	Swahili Village	Bondeni
Water supply	30	80
Water borne sanitation	29	56
Non-water borne sanitation	59	74
Solid waste disposal	34	59
Drainage	48	77
Electricity supply	26	47

Given the implementation of the upgrading project in Bondeni and the want of the same in Swahili Village, one would expect *a priori* households in Bondeni to have better access to on-plot services, in particular water supply and water borne sanitation. This is indeed the case as Table 1 evidences. In Bondeni, 80 per cent of plots have an on-plot water supply compared with only 30 per cent in Swahili Village. And households in Bondeni have better access not only to on-plot water borne sanitation (56 per cent versus 29 per cent), but also on-plot non-water borne sanitation systems (74 per cent versus 59 per cent).

Water Supply

Before assessing household satisfaction with water supply, the water-supply systems to which they have access must be established. The question of satisfaction arises only if households are using a particular service (Paul and Sekhar, 1997). Table 2 shows household access to and levels of satisfaction with water supply in the two *majengos*.

The proportion of owner and tenant households in each *majengo* with access to the main water supply systems—communal water point, on-plot connection, itinerant water vendor and water kiosk—is comparable (Table 2). A considerably higher percentage of both owners and renters in Bondeni (77 per cent and 73 per cent respectively), however, have access to an on-plot water supply than in Swahili Village (28 per cent and 32 per cent respectively). Hence, more owner and tenant households (32 per cent in each tenure stratum) in Swahili Village obtain water from communal water points than do their opposite number (9 per

cent and 20 per cent respectively) in Bondeni. There are no water kiosks in Bondeni, but 32 per cent of owners and 29 per cent of renters in Swahili Village purchase water from the single water kiosk in that settlement. A minority of both owner and tenant households in the two *majengos* buy water from itinerant water vendors.

In order to determine residents' satisfaction with basic infrastructure in their respective settlements, respondents were asked to state how satisfied they were with the infrastructure components to which they have access. To make the responses comparable across services, they were asked to indicate which of the following approximated their views: satisfied, indifferent or dissatisfied. Table 2 shows the satisfaction levels of owners and tenants with the different water supply systems. In both Swahili Village and Bondeni the satisfaction level of owners is generally higher than that of renters. Overall, the most satisfied households, not surprisingly, are those with access to an on-plot water supply: the satisfaction score among all users of this service is higher than 2.40. The least satisfied are households who buy water from itinerant water vendors. With the exception of tenants in Swahili Village, users of this service are wholly dissatisfied with the service (satisfaction score=1.00).

Sanitation

The data on access to sanitation by the different tenure groups in the two *majengos* and their levels of satisfaction with the various sanitation systems are shown in Table 3. The majority of households in the two *majengos* use one form or other of pit latrine. In Swahili Village, 63 per cent of owners and, 43 per cent of tenants have access to an on-plot pit latrine, as do 33 per cent and 47 per cent respectively of their opposite number in Bondeni. Communal pit latrines serve 13 per cent and 18 per cent of owner and tenant households respectively in Swahili Village and 33 per cent and 47 per cent of owners and renters respectively in Bondeni.

What is notable, however, is that despite the provision of water borne sanitation on all plots under the upgrading project implemented in Bondeni, only 11 per cent of owners and 14 per cent of renters in that settlement use this service. This is essentially because residents were not consulted prior to implementation of the project: most owners consequently refused to pay for connection of the facilities which thus remain unused. In Swahili Village, 25 per cent of tenants have access to a shared on-plot water borne sanitation system, while 7 per cent have exclusive use of the same.

Analysis of household satisfaction with access to sanitation reveals considerable disparity (Table 3). Overall, satisfaction levels of households that use shared on-plot pit latrines are the highest. Users of communal and shared on-plot water borne sanitation systems are the least satisfied, but those with exclusive access to on-plot water borne sanitation are wholly satisfied.

Priority on-plot services

An appropriate framework for understanding urban environmental issues in the South must necessarily focus on the priorities of the poor, the vast majority of whom live in informal settlements. These will invariably be concentrated primarily on their unsatisfied needs for basic infrastructure and other economic necessities of life. Household access to water, sanitation and solid waste disposal, in addition to land, energy and unpolluted air, are particularly crucial (Rakodi, 1992).

As an important part of the study, householders' priority ranking of on-plot services was examined. Owners and tenants were asked which three on-plot services, in order of priority, they would specify for an upgrading project in their settlement. Not unexpectedly, the majority of householders accorded water the highest priority (Table 4). Water was ranked first by 69 per cent of owners and 68 per cent of tenants in Swahili Village, and similarly by 75 per

Table 2. Household access to an satisfaction with water supply (percentage frequencies rounded and [scores*] in brackets by tenure group)

	Swahili Village		Bondeni	
	Owners	Tenants	Owners	Tenants
Communal water point	32 [1.76]	32 [1.66]	9 [1.25]	20 [1.16]
On-plot connection	28 [3.00]	32 [2.67]	77 [2.70]	73 [2.67]
Itinerant water vendor	8 [1.00]	7 [3.00]	9 [1.00]	3 [3.00]
Water kiosk	32 [2.50]	29 [1.76]	0 –	0 –

Note: *In calculating the score, the category "Dissatisfied" was given a score of 1; "Indifferent" a score of 2; and "Satisfied" a score of 3. The percentage frequencies in each category are multiplied by the score and the total divided by 100. This creates a scale with a minimum value of 1.00 and a maximum of 3.00. Thus 1.00 represents the least satisfaction while 3.00 represents the greatest satisfaction.

cent and 77 per cent of owners and tenants respectively in Bondeni. Sanitation received the second highest priority ranking. In Swahili Village, 42 per cent and 33 per cent of owners and renters respectively ranked sanitation second as did 43 per cent and 63 per cent respectively of their opposite number in Bondeni.

Willingness to pay

In infrastructure improvement projects, it is imperative that all costs associated with the development work are afford able. Affordability criteria, however, are perhaps too simplistic—the key issue is willingness to pay, which is dependent not only upon income levels and ability to pay, but is also related to perceived use value of housing and the residential environment, perceived benefits to be gained from the service, and household expenditure priorities (Cotton and Franceys, 1994; Rakodi, 1992; Tipple *et al*., 1994). Willingness to pay on the part of the targeted beneficiaries has significant implications for cost recovery.

The majority of both owner and tenant householders in the two *majengos* expressed willingness to pay for the three priority on-plot services they mentioned (Table 5). The positive response rate for the first and second priorities, which for most households are water and sanitation respectively (see Table 4), is especially high. More than eight in ten householders in both tenure groups are willing to pay towards installation of their first two priority on-plot services.

Conclusion

This paper has focused on the access of owners and tenants in two *majengos* to two basic infrastructure components—water supply and sanitation. The analysis shows that households in the two tenure groups have almost equal

Table 3. Household access to an satisfaction with sanitation (percentage frequencies rounded and [scores*] in brackets by tenure group)

	SWAHILI VILLAGE		BONDENI	
	Owners	Tenants	Owners	Tenants
Communal pit latrine	12 [1.66]	19 [2.20]	24 [3.00]	14 [2.27]
Shared on-plot pit latrine	64 [2.77]	41 [2.37]	33 [2.40]	47 [1.95]
Exclusive on-plot pit latrine	0 –	0 –	16 [1.28]	17 [1.20]
Communal water borne system	16 [1.50]	7 [1.00]	2 [1.00]	0 –
Shared on-plot water borne system	0 –	26 [2.14]	11 [1.80]	7 [1.27]
Exclusive on-plot water borne system	8 [3.00]	7 [3.00]	0 –	0 –

Note: See Table 2 for calculation of score

Table 4. Priority ranking of on-plot services (Scores* by tenure group)

	SWAHILI VILLAGE		*BONDENI*	
	Owners	*Tenants*	*Owners*	*Tenants*
Water supply	2.31	2.46	2.36	2.41
Sanitation	1.88	1.38	1.23	1.57
Electricity	1.04	1.16	0.63	0.77
Waste water disposal	0.20	0.41	0.50	0.27
Solid waste disposal	0.04	0.19	0.69	0.38
Drainage	0.16	0.15	0.31	0.22

Note*In calculating the score, if a service was rated 'First' it is given a score of 3; 'Second' a score of 2; 'Third' a score of 3; and any service not rated a score of 0. The percentage frequencies in each category are multiplied by the score and the total divided by 100. This creates a score with a maximum value of 3.00 and a minimum of 0.

Table 5. Willingness to contribute to priority on-plot services (percentage frequencies rounded by tenure group)

	Swahili Village		*Bondeni*	
	Owners	*Tenants*	*Owners*	*Tenants*
First priority	84	93	91	97
Second priority	80	83	91	90
Third priority	84	72	84	89

water supply are satisfied with the service, while satisfaction levels of users of non-water borne systems are higher than those of their counterparts with access to water borne sanitation.

The foregoing discussion suggests that the emphasis in upgrading projects aimed at improving access to water supply and sanitation in informal settlements in Kenya should be on the provision of on-plot water supply and on-plot non-water borne sanitation systems. If the latter, more specifically, is to be effectively implemented, further research into the design, construction, operation and maintenance of pit latrines and inventive systems of emptying the same is all-important in light of the extremely high densities of both people and housing structures in most informal settlements in Kenya. A significant development in this respect is the vacutug (Water Newsletter, 1996).

Given the finding that both owners and tenants in the two *majengos* are willing to pay for improved water supply and sanitation, innovative approaches to the pricing of these basic infrastructure components and cost recovery are advocated. Successful cost recovery can conceivably be realized through the imposition of a betterment tax on property owners, as they are liable to pass on costs to their tenants. In this manner, vital resources may be generated to replicate upgrading projects to improve access to basic infrastructure and thus environmental conditions in urban low-income informal settlements in Kenya.

References

BAROSS, P., 1983, Four experiences with settlement improvement policies in Asia, in: R.J. SKINNER and M.J. RODELL (Eds) *People, Poverty and Shelter: Problems of Self-Help in the Third World*. London: Methuen.

COTTON, A. and FRANCEYS, R., 1994, Infrastructure for the urban poor: policy and planning issues, *Cities*, 11(1), pp. 15-24.

PAUL, S. and SEKHAR, S., 1997, A report card on public services: a comparative analysis of five cities in India, *Regional Development Dialogue*, 18(2), pp 119-132.

RAKODI, C. ,1992, Planning for sustainable urban development: cities and natural resource systems in developing countries. Conference report. *Ekistics* 14(4), pp 409—413.

TIPPLE A.G. ET AL., 1994, *Sustainable Human Settlements in an Urbanizing World, including Issues Related to Land Policies and Mitigation of Natural Disasters*. Report commissioned by UNCHS (Habitat).

UNCHS (United Nations Centre for Human Settlement [Habitat], 1996, *An Urbanizing World: Global Report on Human Settlements, 1996*. Oxford: Oxford University Press.

WATER NEWSLETTER, 1996, Number 245, Innovative emptying: try out a new system in Kibera slum, Nairobi, pp. 2-3.

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