Struggling with Population Heterogeneity in African Cities : the Urban Health and Equity Puzzle

Gabriel Pictet, PhD*[μ] Seni Kouanda*, Sodiomon Sirima[α] and Robert Pond, MD*

DRAFT

DO NOT CITE OR QUOTE WITHOUT AUTHORS' PERMISSION

*Unité d'Enseignement et de Recherche en Démographie, Université de Ouagadougou.
BP 7118 Ouagadougou, Burkina Faso

[μ]Population Council and Université de Montréal

[α]Centre National de Recherche et Formation sur le Paludisme, Ouagadougou.

Gabriel Pictet : pictet@fasonet.bf
Bob Pond: inibob@yahoo.com

This paper is based on research funded USAID and by the Rockefeller and Mellon Foundations.

ABSTRACT

African cities are growing fast and yet their health systems remain totally inadequate. Part of the urban health problem results from the very characteristics of African cities: cultural heterogeneity, loose and volatile social organization, abundant, expensive and under-regulated healthcare, undermined by health workers who are often unaccountable, incompetent and/or abusive. As a result, malaria continues to be the leading cause of infant and child mortality despite the availability of inexpensive and effective antimalarials. This paper analyses the challenges of urban health in SSA using the example of childhood malaria in Ouagadougou, the fast growing capital of Burkina Faso. It then evaluates an alternative health strategy designed specifically for the urban setting and discusses the feasibility, effectiveness and equity of population-based distribution of antimalarials in the light of the intrinsic characteristics of African cities.

Keywords: Malaria, Household management of malaria, Health equity, Socio-economic determinants of health, Child survival, Urban health, Ouagadougou, Burkina Faso, Sub-Saharan Africa.

INTRODUCTION

Until recently, demographic literature on urban sub Saharan Africa (SSA) usually focused on the differences between rural and urban Africa, or the differences between cities. While these comparisons show that cities are more advanced in terms of economic development or demographic transition than rural areas, they also obscure some fundamental characteristics of cities. Indeed, cities are not composed of homogenous 'communities' and neighborhoods are not "urban villages". Perhaps more importantly, cities are the forefront of social change and of the focal point of the tensions that inevitably arise when traditional values and western lifestyles clash. Yet social policies in SSA are designed and evaluated according to social statistics that do not describe these fundamental development characteristics, and do not explicitly take into account more relevant studies and experiments in urban social dynamics. As a result, social programs target and allocate resources to the rural provinces that are worst off in terms of social indicators (most of which are means that hide substantial disparities), and leave it to the private sector to respond to the health or education needs of urban populations. Policy documents refer to explicit statistical benchmarks and objectives, but say nothing of the social underpinnings and cultural relevance of the strategies that are implemented. Finally, primary health care in SSA is designed for the rural setting. This makes sense in countries like Burkina Faso where 80% of the population is rural, but the absence of specific health strategies that take into account the characteristics of urban populations, and especially the urban poor, is problematic as Africa's cities are rapidly growing.

This paper addresses the inadequacy of the existing health system in Ouagadougou, the Capital city of Burkina Faso. We focus on the case of childhood malaria, one of the leading health problems in Burkina Faso and first cause of infant and child mortality in Ouagadougou.

The urban jungle : healthcare in Ouagadougou

The Urban jungle is above all characterized by an abundant and unregulated supply of health services. Despite competition among providers, healthcare is expensive and health related costs have greatly increased in the last decade[i]. Families state the cost of health care as the greatest

obstacle to good health. Healthcare is of poor quality, particularly for the disadvantaged groups who do not have access to the private clinics and medical doctors[ii]. As a result, people have low expectations of health service delivery, to the point that people do not go to the public health center unless they feel that the disease is life threatening. Self medication is the first health seeking behavior and medicines are often bought from street vendors rather than pharmacies. Contrarily to village health outposts where health workers tend to feel some kind of accountability to the community, client-provider relations in the city are impersonal and, at best, patronizing. Patients are passive, intimidated and feel socially inferior to the heath service provider. The health providers are poorly motivated, ill paid and abuse their dominant position to extort money from their patients[iii].

The rural-urban opposition leads to the implicit assumption that the city is culturally isolated from the rest of the country. In fact the vast majority of city dwellers have a village they call home, and regularly maneuver between the two. Hence urban society in Africa is better described as a dynamic and volatile continuum of beliefs. For example, "traditional" beliefs about witchcraft are highly prevalent in Ouagadougou and affect health seeking strategies. Traditional medicine is widely used, and is a first recourse for diarrhea, though not in case of fever[iv]. Migration and social change in Ouagadougou are also creating additional stress on the health system as demographic pressure increases and traditional social control and solidarity mechanisms break down. There is limited 'village solidarity' in the city and social mechanisms that provide an element of health insurance in rural areas are weaker in the urban setting. Thus, economic disparity has a greater impact in the urban environment than in rural communities. In terms of economic and social differentials in health, urban inequities are greater than in rural areas. This is because there is a greater range of health service options in urban areas and a greater range in social and economic status in urban settings.

The Health system is under increased pressure with the expansion of HIV/AIDS and non-infectious lifestyle-related diseases and accidents, and the pressure is strongest in large cities, where all the general hospitals and clinics are located. Increased demand for services has lead to an increase in the cost of healthcare in the public sector and a shift in the locus of health care. Services are increasingly in the private and informal health care sectors.

Owing to the high cost, poor quality, low expectations for services and unequal social relationships between client and provider, socially vulnerable groups are reluctant to seek "modern healthcare." If they receive care, they receive less attention and inferior services than the more affluent households. The uneducated urban poor are more often victims of predatory practices than the rural poor or the wealthier, better educated city dwellers. As in most cities, the growing population of Ouagadougou is loosely organized, socially diffuse, culturally heterogeneous, and rapidly changing. Organizing health and social services is more complex than corresponding organizational efforts in rural social settings.

The Ouagadougou Urban Health and Equity Initiative

UERD and its partners in the Ouagadougou Urban Health Initiative conducted a series of qualitative and quantitative health surveys in 2002 and 2003 in its two pilot sites. One pilot site, Taabtenga, is a spontaneous, undeveloped settlement at the eastern periphery of Ouagadougou; the other, Wemtenga, is more centrally located and was developed in the eighties. Survey findings demonstrate socio-economic (wealth, educational attainment of household head) and health (childhood malnutrition) disparities between neighborhoods, but also substantial inequalities among residents in the wealthier neighborhood of Wemtenga.

In 2003, the CNRFP launched in the same two neighborhoods a pilot intervention consisting in the community distribution (CBD) of prepackaged therapeutic units (PTU) Each PTU consists of a sachet containing exactly the number of tablets of chloroquine and paracetamol required to treat a child of a specific age group. The sachet also includes a label which shows in a pictogram the number of tablets to give to the child each morning and each afternoon/evening during the 3 days of treatment. The PTUs are sold for a small profit by community health volunteers (CHVs) selected and supported by existing "community" groups (e.g. women's associations, church groups). UERD is evaluating the intervention in term of the feasibility of "community" mobilization in the city, treatment compliance and household health expenditures.

In the first part of this paper we describe how different households in two very different neighborhoods cope with malaria in Ouagadougou and highlight the inadequacy of the current health system. In the second part of the paper we present the results of an alternative, population-based health strategy and discuss its relevance and limitations for African cities.

DATA AND METHODS

UERD implemented a Demographic Surveillance System (DSS) in the two pilot neighborhoods: Taabtenga, with a baseline population of 2,981 individuals in 683 households and Wemtenga with 1,986 individuals in 393 households. A wealth index was calculated for each household using principal components analysis of data on two indicators of housing quality (number of rooms inhabited by the household; and wall construction) and 5 indicators of household assets (television, radio, bicycle, motorcycle and car)[1]. The methodology was that described by Montgomery *et al* ([v]) and used by Gwatkin *et al* ([vi]) to estimate household wealth based upon data from Demographic Health Survey data of Burkina Faso and other countries.

A baseline panel survey on management of childhood malaria was carried out in October 2002 in all the DSS households with children under five. These data were supplemented with data on measures taken for prevention of malaria from a more general household survey of the same households conducted in May 2002 (n=475 households). UERD fielded a final panel survey to evaluate the intervention in October 2003 (n=1042 children under 7). The final survey is supplemented with individual structured interviews with PTU clients (n=124), focus group discussions with health workers, community volunteers and parents of children who had malaria in the four weeks preceding the survey. UERD also conducted exit interviews at the 12 health

[1] NB: The assets used to compute the wealth index changed slightly between baseline and final survey. In this draft the baseline wealth index is grouped in quartiles. Baseline wealth index will be recomputed using the second method and presented in quintiles in the final version of this paper.

centers, clinics and private practitioners in or nearest the two pilot sites to compare prescriptions and costs to treat childhood fevers[2]

Please note that the populations surveyed are not statistically representative of Ouagadougou nor any of its different quarters. The DSS households are not samples but complete populations of three census tracks[3]. Hence we do not present statistical tests or confidence intervals with the survey results.

All data analysis was carried out with STATA version 7.0

RESULTS

Part 1: Urban heterogeneity and disparities in health

We first describe the difference between two types of urban settings. We then show the inequalities in exposure, incidence, treatment and spending relative to urban malaria in these two settings and highlight the inadequacy and inequities of the existing health system

Inequalities between and within two neighborhoods

Wemtenga, the pilot *loti* (developed, or zoned) neighborhood, and Taabtenga, the pilot *non-loti* (undeveloped) neighborhood, are shown in Figure 1. Wemtenga is close to a number of paved roads and health facilities (government and non-governmental hospitals and health centers as well as private-for-profit clinics and pharmacies).

[2] The date from the exit survey is being processed and will not be presented in this paper.

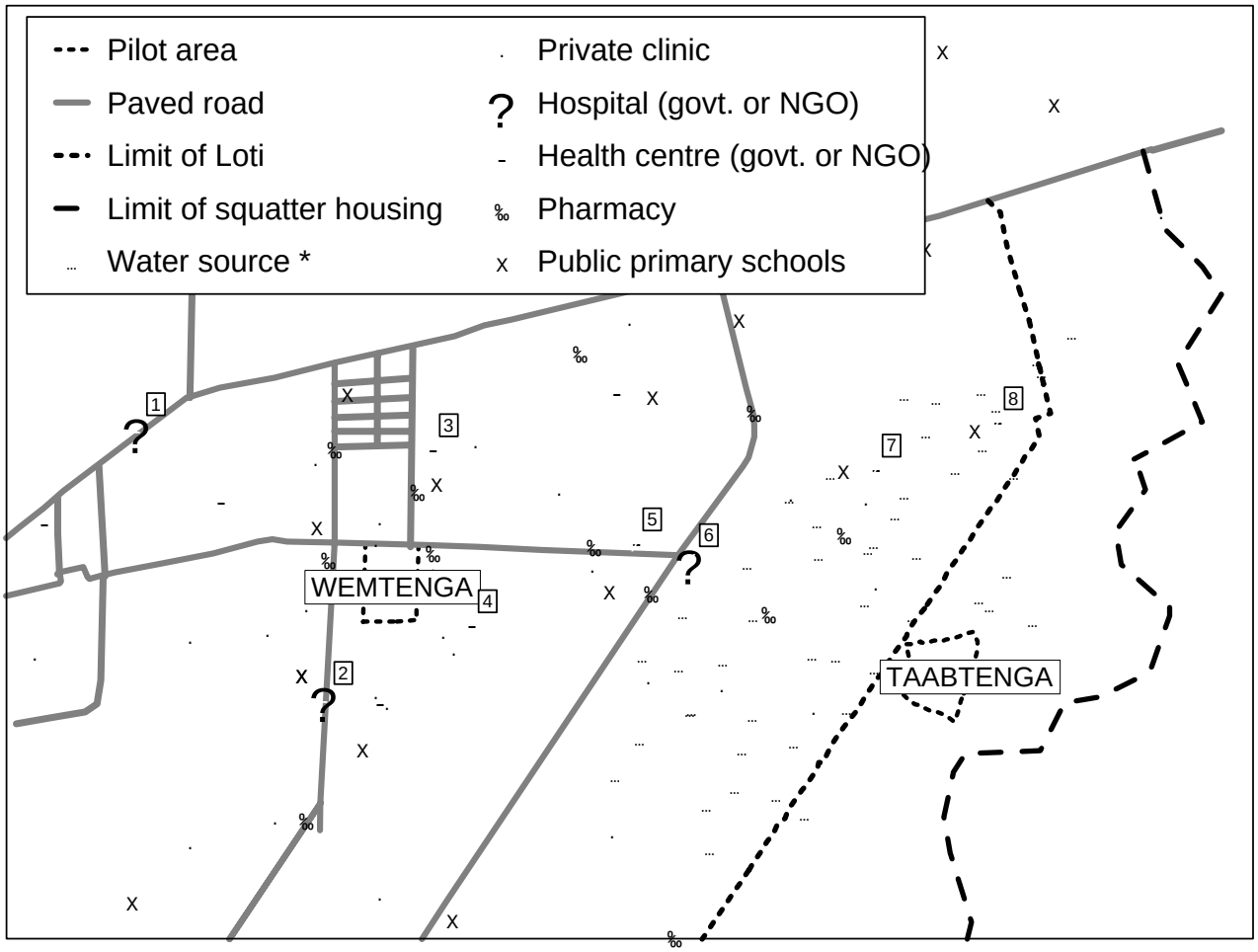
[3] Two adjacent census tracks in Wemtenga and one census track in Taabtenga. UERD is planning to scale-up the Ouagadougou DSS by randomly select a sample of census tracks or zones in order to allow city-wide generalizations.

Taabtenga, on the other hand, is further removed than is Wemtenga from various infrastructure including paved roads and water sources. Only the water sources nearest to Taabtenga are shown on the map (hence the asterisk next to this item on the map legend).

Water sources and public facilities (health facilities and school) are limited to the *loti* neighborhoods. The disparities in geographic access to public services are mirrored by differences in proximity to private services (as shown by the distribution of private clinics and pharmacies) although private primary schools (not shown on the map) have begun to appear in *non-loti* neighborhoods.

The figure also shows for each of the two neighborhoods the location of the health facilities that were most frequently consulted for preventive and curative health services for children under five. The panel survey showed that just 4 health facilities near to Taabtenga (shown with white X's overlaying the black crosses that represent each health facility) accounted for 28 of the 29 facility visits in the past week for children under five from that neighborhood who were sick with fever or diarrhea in the preceding week. Similarly, another 4 health facilities near to Wemtenga (shown with white crosses overlaying the black crosses) accounted for all of the 14 facility visits in the past week for sick children from that *loti* neighborhood. None of the sick children were taken to a private-for-profit health facility. Rather all of the children visiting a health facility were taken either to a public health center (93% in Wemtenga vs. 38% in Taabtenga) or a non-governmental/religious clinic, health centre or hospital (7% in Wemtenga vs. 62% in Taabtenga). Figure 1 illustrates the key importance of proximity in determining care-seeking behavior.

Figure 1: Map of eastern Ouagadougou showing pilot sites and surroundings (scale: 2cm=1 km).



Demographic and socioeconomic disparities

The top of Table 1 and the left panel in Figure 2 show how different the demographics of two neighborhoods in the same city can be. The super-imposed age pyramids in Figure 2 contrast the differences in age structure between the *loti* and *non-loti* areas. The *loti* areas have a higher proportion of young adults and a much smaller proportion of young children. Indeed, the *non-loti* areas have the same population structure as a rural village, with over 17% of the population under five years of age. The TFR computed for the period of demographic observation (march 2002-November 2003) was 3.9 in Taabtenga and only 1.5 in Wemtenga. These "demographic

inequalities" have obvious implications for spatial targeting of child survival and reproductive health interventions.

Table 1 also shows the socioeconomic differences between the two pilot populations. In Taabtenga, four household heads in five do not have a primary school diploma whereas more than half in Wemtenga went beyond primary school. Differences in habitat between the two pilot sites are even more striking. In Taabtenga, practically all houses are built with mud bricks, have no ceilings, running water nor electricity (the latter two characteristics being, by definition, general to all *non-loti* areas) whereas 71% in Wemtenga have concrete walls, 42.9% have ceilings, 79.6% have running water in their compound and 79.5% have electricity. Likewise, a greater proportion of households in Wemtenga have cars, motorcycles and televisions. Those in Taabtenga are more likely to have bicycles and radios.

The wealth indicator being a function of habitat characteristics and household assets, it is expected that a greater proportion of poor households live in Taabtenga than in Wemtenga. Indeed, in Taabtenga, two thirds of the households belong to the two poorest quartiles while the proportion is reversed in Wemtenga.

Social heterogeneity is not only spatially defined. In the same territory coexist households of all wealth categories. This is especially true in the *loti* neighborhood of Wemtenga where 10% of the households belong to the poorest quartile and 30% belong to the richest quartile. It is also true, but too a lesser degree, in the squatter settlement of Taabtenga where 25% of the households belong to the two richest quartiles.

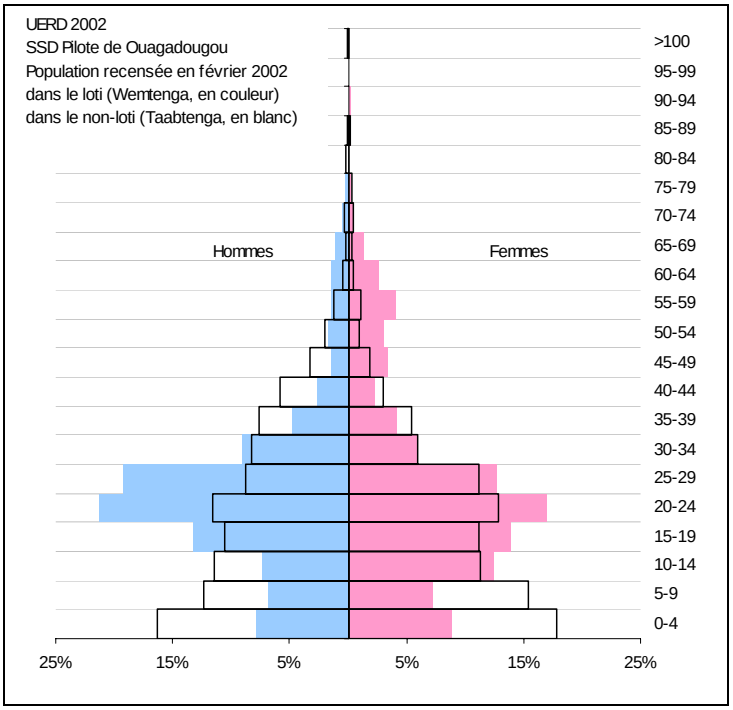
Table 1: Characteristics of pilot neighborhoods: total population and panel households with children under five.

	Taabtenga (*non-loti*)		Wemtenga (*loti*)	
	Total Population	Panel Households	Total Population	Panel Households
Population characteristics				
Total population	2,981 (100%)	1995 (100%)	1,986 (100%)	899 (100%)
Male	1,563 (52.4%)	963 (48.3%)	1,050 (52.9%)	424 (47.2%)
Female	1,418 (47,6%)	1,032 (51,7%)	936 (47.1%)	475 (52.8%)
Ethnic group				
Mossi	2,238 (75.0%)	1,536 (77.2%)	1,152 (58.0%)	613 (74.6%)
Other (includes foreigners)	743 (24.9%)	454 (22.8%)	834 (42.0%)	286 (31.8%)
Religion				
Moslem	1,984 (66.6%)	1,318 (66.1%)	1,207 (60.8%)	639 (71.1%)
Other (mostly Christians)	997 (33.5%)	677 (33.9%)	779 (39.2%)	260 (28.9%)
Household characteristics				
Number of households	683 (100 %)	358 (100%)	393 (100%)	117 (100%)
Number of households with child <5 yrs	372 (54.5%)	358 (100%)	122 (31.0%)	117 (100%)
Mean household size	4.4	5.5	5.1	7.7
Sex of household heads				
Male	621 (90.9%)	336 (93.8%)	300 (76.3%)	99 (84.6%)
Female	62 (9.1%)	22 (6.2%)	93 (23.7%)	18 (15.4%)
Educational attainment of household heads				
None	549 (80.5%)	314 (87.2%)	142 (37.0%)	55 (47.8%)
Primary school	77(11.3%)	28 (7.8%)	47 (12.2%)	16 (13.9%)
Middle, High school, vocational training	53 (7.8%)	18 (5.0%)	108 (28.1%)	30 (26.1%)
University	3 (0.4%)	0	87 (22.7%)	14 (12.2%)
Habitat				
Walls in mud bricks	674 (98.7%)	357 (98.9%)	114 (29.0%)	36 (30.8%)
Roof without ceiling	680 (99.6%)	359 (99.4%)	222 (57.1%)	70 (60.9%)
Earth floor	32 (4.7%)	15 (4.2%)	1 (0.2%)	-
Private tap in house or compound	1 (0.2%)	1 (0.3%)	308 (79.6%)	88 (77.2%)

	Taabtenga (*non-loti*)		Wemtenga (*loti*)	
	Total Population	Panel Households	Total Population	Panel Households
Electricity	6 (0.9%)	5 (1.4%)	324 (82.4%)	93 (79.5%)
Wealth indicator				
Richest quartile	22 (3.2%)	17 (4.7%)	124 (31.6%)	49 (41.9%)
Second quartile	150 (22.0%)	105 (29.1%)	146 (37.1%)	42 (35.9%)
Third quartile	191 (28.0%)	114 (31.6%)	81 (20.6%)	16 (13.7%)
Poorest quartile	320 (46.8%)	125 (34.6%)	42 (10.7%)	10 (8.5%)

Source: TOTAL POPULATION: UERD, DSS-OPO (May 2002). HOUSEHOLD PANEL: Household Health Survey (May-June 2002). The household health survey questionnaire was administered to all DSS households with children under 5 years of age

Figure 2:
Population structure by age and sex in the DSS pilot sites of Wemtenga (loti, shaded) and Taabtenga (non-loti, in white)

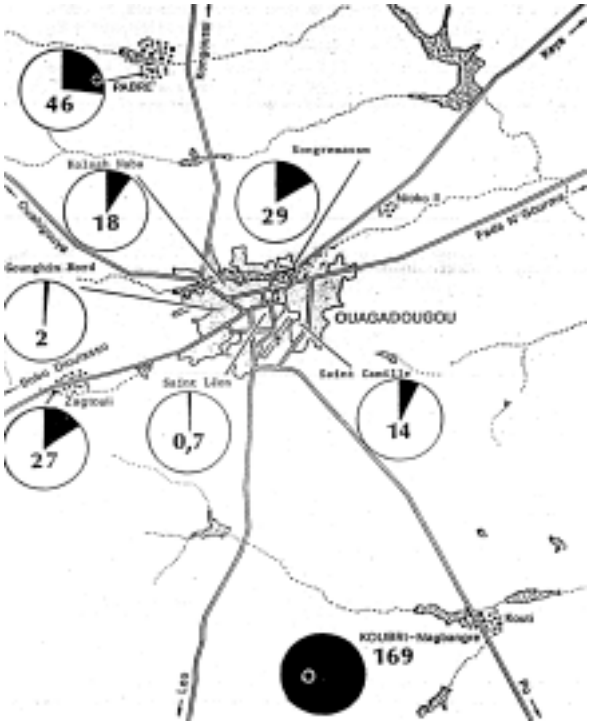


UERD, Ouagadougou Population Observatory,
Baseline Demographic Surveillance census, 2002

Unequal living conditions

Disparities in the incidence of malaria in Ouagadougou have been explained by environmental factors. Incidence of malaria is higher in spontaneous settlements such as Taabtenga where un-improved drainage canals and pits dug for the manufacture of mud bricks support the breeding of mosquitoes. Indeed, studies from the 1980's showed that vector species were 20 times more common in the undeveloped neighborhoods of eastern Ouagadougou (see pie chart for Saint Camille in figure 1) than in the central, developed sections of the city (see pie chart for Saint Léon in figure 1).

Figure 3: Mean density of Anopheles gambiae resting inside homes in Ouagadougou and three proximate villages. Number in circle represents the number of fertile female mosquitoes per room, average captures in July-Aug-Sept 1984. Scale: 169FF/room=360º



Source: Rossi, P. *et al.* 1986 ([vii])

Disparities in malaria incidence can also be attributed to economic/behavioral factors at the household level. Our May 2002 survey data show a lower percentage of ownership of bed nets in Taabtenga (7.5%) than in Wemtenga (23%). However, few children in either Taabtenga (3%) or Wemtenga (6%) are protected with insecticide treated nets.

The data from our baseline malaria survey (see Table 1), conducted in October 2002 at the end of the peak malaria season, show a 4 week prevalence of childhood fever 50% higher in Taabtenga (54%) than in Wemtenga (36%).

Table 1 : Fever in the past 4 weeks, auto-medication and administration of chloroquine to children in the two pilot neighborhoods of Ouagadougou

	Taabtenga		**Wemtenga**		**Total**	
	N	%	N	%	N	%
Children under five surveyed	467		150		617	
Children with fever	254/467	54	53/150	35	307/617	50
auto-medicated	182/254	72	37/53	70	219/307	71
auto-medicated w/ chloroquine	139/254	55	17/53	32	156/307	51
for 3 days (correct)	40/139	29	7/17	41	47/156	30
for <3 days	49/139	35	6/17	35	55/156	35
for >3 days	44/139	32	4/17	24	49/156	31
for unknown days	6/139	4.3	0	0	6/156	3.8

Source: UERD October 2002 baseline malaria survey

Unequal use of drugs

Our survey data show similar recourse to auto-medication in the two neighborhoods. At baseline the majority of households in Taabtenga (72%) and Wemtenga (70%) auto-medicated childhood fevers with modern anti-malarials. Modern medicines (either from auto-medication or from a health facility) were usually begun the same day that the fever was noticed. For a small percentage of children, administration of a modern medicine was delayed one day or more : 8% in Taabtenga vs. 0% in Wemtenga (data not shown).

Nevertheless, differences in health expenses relative to childhood fevers between the two neighborhoods were substantial. The households that auto-medicated in Taabtenga did so with cheaper medications than in Wemtenga (see Table 2); 60% of children that were auto-medicated in Taabtenga received chloroquine tablets without any other anti-malarial against 22% of children auto-medicated in Wemtenga ; 11% of children in Taabtenga vs. 22% of those in Wemtenga received chloroquine syrup (more expensive than chloroquine tablets); 8% of children in Taabtenga vs. 16% of those in Wemtenga were given even more expensive alternative anti-malarials (SP, quinine, etc…); 20% of children in Taabtenga vs. 40% in Wemtenga had their fevers managed without any anti-malarial at all. This last finding is counter-intuitive but is consistent with other research showing that fevers are less frequently treated presumptively for malaria when they are managed at hospitals or treated by doctors.

Table 2: Choice of drugs for auto-medication of febrile children in the pilot neighborhoods

	Taabtenga		Wemtenga		Combined	
	n	%	n	%	n	%
Chloroquine tablets	110	60	8	22	118	54
Chloroquine syrup	20	11	8	22	28	13
Other anti-malarials	14	8	6	16	20	9
No anti-malarial	38	21	15	40	53	24
Total febrile children auto-medicated	182	100	37	100	219	100

If auto-medicating with chloroquine, caretakers in Taabtenga appeared less likely than caretakers in Wemtenga to administer the drug for the correct number of days (29% vs. 41% -- see Table 1). In fact less than 5% of caretakers in either neighborhood (2% in Taabtenga vs. none in Wemtenga) administered chloroquine the correct number of days (i.e. 3 days) *and* the correct number of times (i.e. once) each day (data not shown).

Unequal use of health facilities

In both neighborhoods, many of those who began with auto-medication or traditional remedies subsequently visited a health facility. Table 3 shows the findings for children with

uncomplicated fevers – defined here as a fever without coma, convulsion, uncontrollable vomiting, blood transfusion or hospitalization. The percentage of uncomplicated cases of fever which were never brought to a health facility is higher in Taabtenga (48%) than in Wemtenga (38%). Few childhood fevers were managed at home without any modern medicines : 3.5% in Taabtenga vs. 0% in Wemtenga. The May survey showed that very few households from either neighborhood use private-for-profit clinics: they prefer religious charity clinics, and, to a lesser extent, public health facilities (data not shown).

Table 3: Highest level of care sought for febrile children without complications* in the pilot neighborhoods

	Taabtenga		Wemtenga		Combined	
	n	%	n	%	n	%
Health facility	118	52%	29	62%	147	53%
Auto-medication	103	45%	18	38%	121	44%
No modern therapy	8	3.5%	0	0	8	2.9%
Total febrile children without complications*	229	100%	47	100%	276	100%

* Coma, convulsion, uncontrollable vomiting, blood transfusion or hospitalization

Unequal health spending

Even if the child has no complications, payments increase substantially when people resort to a health facility, whether it be private or government and whether they are more affluent or poor:

Table 3: Health expenses for a case of childhood fever with no complications, per wealth quartile, in CFA francs (UERD, DSS and Malaria Survey, October 2002)

Wealth quartile	Payments if clinic avoided	Payments with clinic
1 (poorest)	420 (0% >5,000)	2028 (7% > 5,000)
2	695 (7% >5,000)	2720 (14% > 5,000)
3	1170 (0% > 5,000)	4038 (30% > 5,000)
4.(wealthiest)	1237 (0% > 5,000)	5169 (44% > 5,000)
Total	880 (1% > 5,000)	3489 (21% > 5,000)

To put this into context -- the 1998 Enquête Prioritaire II (a World Bank-sponsored Living Standards Survey) found that the average income of residents of Burkina's two largest cities was 221,324 F CFA/person/year of which the average expenditure on health care was 12,371 F CFA/person/year. Thus, auto-medication (average of 880 f CFA per treatment = 7% of annual urban per capita out-of-pocket health expenditure) was much more affordable than treatment of uncomplicated malaria at a health facility (average of 3,489 f CFA = 28% of this annual health budget).

A strategy to reduce malaria related inequities in the urban setting

Research findings from the recent pre-packaged anti-malarial (chloroquine plus paracetamol) trial in *rural* Burkina show that early treatment at home of childhood fevers with pre-packaged anti-malarials reduces by 50% the incidence of severe malaria ([viii]). Based upon such findings the Ministry of Health of Burkina Faso has now established a nationwide policy to train community volunteers to sell pre-packaged chloroquine and paracetamol (PTU).

Our October 2002 findings suggested that such an intervention is ideally suited to meet the health needs of the urban poor and that it should reduce malaria-related inequities in Ouagadougou. As stated above, there is a higher risk of malaria among those living in spontaneous settlements; poor households are more likely to auto-medicate with chloroquine tablets; poor households seem to have greater difficulty in administering a correct dose of chloroquine. Moreover, pre-packaged

chloroquine with paracetamol (between 70 and 100 francs CFA per packet[4]) costs less than the chloroquine purchased directly from local pharmacies and other drug sellers. Correct treatment with pre-packaged anti-malarials and confidence in their efficacy on the part of caretakers could reduce the need to seek care at health facilities and thus dramatically reduce household expenditures on malaria.

CNRFP and UERD[5] have thus implemented a pilot pre-packaged anti-malarial intervention in Taabtenga and Wemtenga to answer the following questions: can a community-based intervention work in an urban setting? Is it equitable? How will acceptance and compliance of poorer households compare with that of wealthier households? What impact will the intervention have on household expenditures on malaria? We answer these questions in the second part of this paper

Part 2 the feasibility, equitability and effect of community-based distribution of prepackaged anti malarials in two urban settings

We now present the results of the malaria intervention to assess if: (1) it is possible to effectively mobilize, train, and supervise community volunteers in the two types of urban settings and (2) if the mediation of existing community organizations facilitate the accessibility of chloroquine in all social groups.

Community mobilization in an African city

The CNRFP decided on the onset to keep the intervention design as close to its successful trial in rural Burkina in order to facilitate nationwide replication. In the rural experiment, the district health teams trained traditional community leaders to be the distributors of the PTU with the idea that they are well known in their village and had more authority than others. Many community volunteers thus turned out to be illiterate.

---

[4] around 12 US cents

[5] The National Malaria Research and Training Centre (CNRFP) conducted the pilot intervention. UERD evaluated it. The pilot and its evaluation are funded by a USAID/Making Cities Work grant to the Population Council.

Our DSS data and previous contextual mapping exercises showed that the situation was very different in Taabtenga and Wemtenga[ix]. In both pilot sites, a greater proportion of the adult population was literate than in rural villages. In Wemtenga, the traditional leaders are sometimes called upon to resolve conflicts but have little authority per se. In Taabtenga, the community chief still wields some power as he is the one who traditionally allocates vacant plots of lands to new migrants. But his power is also declining as the neighborhood is being zoned. Plot allocation will soon be the prerogative of the local government.

Recruitment of CHV

The community diagnosis in both sites suggested that traditional leaders in the city would alone would not be able to market the antimalarials. Rather, the intervention would mobilize existing formal and informal community groups (associations, choirs, church and prayer groups, etc.) and ask these groups to elect volunteers to market the PTU. We conducted a quick opinion poll (n=51) in both neighborhoods to assess what kind of characteristics mothers and fathers of young children expected from health community volunteers. Characteristics requested were moral more than intellectual (courteous, attentive, welcoming[6]) though when asked 95% said they would prefer that the CHV was literate. Respondents stressed the importance of kindness, honesty and communications skills. 91% in Taabtenga and 71% in Wemtenga said they were willing to walk up to 15 minutes to buy medicine from a CHV.

One issue was the proportion of mothers who belonged to a community group. Among the respondents of this poll, 18% in Taabtenga and 11% in Wemtenga said they belonged to a community organization. A greater proportion of the respondents in Wemtenga felt it was important for the CHV to belong to a community organization (18% in Taabtenga and 42% in Wemtenga). In Taabtenga an even greater proportion of respondents preferred that the traditional leaders select the CHV rather than community organizations (64% versus 23%) whereas in more "modern" Wemtenga the majority of the respondents wanted the community organizations to select the CHV (58%) rather than the traditional chief (37%). Overall, the poll results suggested

[6] We see this as an additional indication of how impolite, uncommunicative and arrogant some professional health workers tend to be.

that the CNRFP community mobilization strategy was acceptable with the condition that the CHV were literate.

Another major difference between the rural and urban settings is that in the former the physical and social boundaries of a village usually coincide. This is obviously not the case in Ouagadougou where neighborhoods are not urban villages. During the mapping of the two sites, we interviewed residents and ask them to define the boundaries of their *quartier* (neighborhood). In Wemtenga these boundaries coincided with the major boulevards, yet these recent clear-cut boundaries do not correspond to those of the traditional *quartier* of Wemtenga as defined by the traditional leaders and elders. Community groups in Wemtenga also recruit their members on the other side of the main roads. In Taabtenga, the situation is different as no obvious physical boundaries exist. In fact, this peripheral neighborhood is constantly expanding into the bush. CNRFP thus decided to hire community volunteers from a larger part of the catchment areas of the two health centers, and not just from the DSS pilot sites.

The CNRFP and the district health teams trained sixteen volunteers in Taabtenga and 31 in Wemtenga in August 2003, during peak malaria season. These volunteers belonged to and were selected by 21 different community groups. Of these 44 volunteers, a third live in or in walking distance from the DSS pilot sites that are used to evaluate the intervention. They started distributing the PTU in the first week of September (see Table 2).

CBD procedures and results

CNFRP purchased the chloroquine and paracetamol in bulk from CAMEG, the government's official drug provision agency. CNRFP sealed these drugs into single treatment packages and then distributed them to the depots of the government clinics adjacent to two study neighborhoods. These same depots regularly stock and dispense both chloroquine and paracetamol from CAMEG but the specially packaged anti-malarials for this study were stored in a separate locked box.

Each package includes a user-friendly printed color label indicating with a drawing the age of the child and the numbers of tablets of chloroquine and paracetamol to administer during each of the three days of treatment. The dosages are those specified by national policy of the Ministry of Health of Burkina Faso, as indicated in the following table.

Table 1. Dosage Specified by the Ministry of Health of Burkina Faso

Age group	Day 1		Day 2		Day 3
	Chloroquine*	Paracetamol**	Chloroquine*	Paracetamol **	Chloroquine*
0-6 months	¾	¼ tab each 12 hours	¾	¼ tab each 12 hours	½
7-11 months	1	½ tab each 12 hours	1	½ tab each 12 hours	½
12-47 months	1 ½	¾ tab each 12 hours	1 ½	¾ tab each 12 hours	¾
48-83 months	2	1 tab each 12 hours	2	1 tab each 12 hours	1

*Chloroquine tablets with 100 mg base and **Paracetamol 500 mg tablet. Chloroquine is the front line drug against presumptive malaria. Resistance to chloroquine in Ouagadougou is estimated between 10 and 20%.

CNRFP trained a pharmacy technician at each depot to maintain the inventory of the PTUs and release them to either the trained nurses or the CHV. The CHVs keep the PTUs in their houses in a secure box from which they directly sell the packages to clients.

Policy of the Ministry of Health requires that such medications be sold in order to support the Ministry's cost recovery efforts. As in the rural study described above (Sirima et al., 2003), the CHV sold the packets at a price established in consultation between project coordinators, local health officials, and community representatives. This price provides for a small incentive for the CHV.

CNFRP trained 2 professional nurses at each of two adjacent public clinics to serve as community mobilizers, trainers, and supervisors of the CHV.

The CHV were trained to explain the following: (1) the fever may be caused by an illness that does not respond to the drugs available; (2) the agent is not a qualified health professional and is not able to tell whether the fever will respond to the drugs; and (3) to be sure of the best possible treatment, the child should be examined by a qualified health professional. Anyone hesitant to use the medications is to be encouraged to seek assistance from a qualified health professional. The CHV is supposed to ask whether the child has any signs of complicated, severe, or unresponsive fever and counsel the mother on the need to consult a qualified health professional in such cases. Those seeking to buy treatments for persons of age 7 or older were referred to the health center. The CHV is supposed to counsel all their clients that there is a risk that the child's

illness may not respond to the medicines and that they should immediately take the child to the health center if the child's condition worsens or if the fever has not gone away in 48 hours. Following this screening, if the CHV deems it appropriate, s/he explains the age-specific course of treatment for malaria and offers to sell the appropriate packet. Finally, the CHV asked whether the research team has the permission of the mother to re-contact her within two weeks.

The CHV recorded on a register the key items of information (date of sale, first name of person buying the drug, house number, first name and age of child being treated, packet size) on each sale[7]. UERD field staff used this register to locate all of the clients for an interview within 2 weeks of the sale. The client survey aimed to check the clients compliance to the PTU course and evaluate the CHV performance in providing the correct information to the client. In November UERD conducted the final household survey to estimate the interventions coverage and effect on health seeking behavior in case of uncomplicated childhood fever.

Results in Community mobilization

The community organizations in Wemtenga were more spread out than in Taabtenga. As a result, only three CHV in Wemtenga lived close enough to the DSS sites to sell PTU to our sample. In terms of actual client contact the Client survey in the DSS zones show that the community organizations in Taabtenga were smaller and that their members were concentrated in smaller areas.

Table 2: Number of CHV per neighborhood recruited.

	Taabtenga	Wemtenga
CHV selected by Associations	16	31
CHV at beginning of project	14	30
CHV with more than 1 completed sales register	14	19
drop outs or non performing CHVs	0	11

UERD, 2003

[7] UERD issued to each DSS household a green card with this number printed on it to facilitate locating the PTU clients for the client survey

Table 3: Sale of PTU according to CHV registers

Number of PTU sold to households outside DSS sites	1615
Number of PTU sold to households from DSS sites	164
Number of contacts between CHV and supervisors (nurse)	37
Number of DSS households that purchased PTU	124

Client survey results

One of our concerns with the strategy of recruiting community groups to distribute the PTUs was that these groups would favor their own membership, and that non-member household would not have as much access as the group members. Table 4 shows that only a minority of clients belonged to the same organization as the CHV that sold them the PTU, and less than a third learned of the PTU at a community meeting in Taabtenga. In both neighborhoods the clients learned of the PTU directly from the CHV. The focus groups and informal meetings we had suggest that the main concern of the CHV is to sell the PTU and to be respected by their communities (and not just their group)

Table 4: Extent of community group mediation

	Taabtenga		Wemtenga	
	n	%	n	%
Client knows the CHV's name	72	71.3	15	100.0
Client knows another CHV	69	68.3	3	20.0
Client knows the name of the CHV's community organization	31	30.7	14	93.3
Client and CHV belong to same community organization	26	25.7	2	13.3
Client and CHV are related	15	14.9	4	26.7
Client heard about PTU from the CHV herself	42	41.6	12	80.0
Client heard about PTU at a community meeting	30	29.7	1	6.7
Client heard about PTU at church, mosque	3	3.0	0	0.0
Client heard about the PTU from a neighbor or friend	12	11.9	2	13.3
Other source of information*	14	13.9	0	0.0
Total	101	100.0	15	100.0

*includes project staff and interviewers. Source: UERD, PTU client survey, 2003

Table 5: CHV group affiliation as reported by PTU clients (PTU Client Survey, Nov 2003)

	Taabtenga		Wemtenga	
	n	%	n	%
Religious communities				
Protestants (Communauté religieuse, Centre d'Evangelisation, Eglise des Assemblées)	6		0	
Catholics (Church)	8		0	
Moslem (Mosque)	9		9	
Total religious affiliations	**23**	**22.8**	**9**	**60.0**
Non religious groups				
SOJES	**-**	**-**	**5**	**33.3**
St Joseph de Taabtenga, Wend Pulongo, Song Taaba, Tal Taaba	**8**	**7.9**	**-**	**-**
Client does not know CHV's affiliation*	**70**	**69.3**	**1**	**6.7**
Client and CHV are members of the same group	26	25.7	2	13:3
Total	101	100.0	15	100.0

Source: UERD, PTU Client survey, 2003.

Client interviews suggest major differences in the effects of the CBD strategy in the two settings, though because of the small number of clients and CHV in Wemtenga we should be cautious in generalizing. In both Taabtenga and Wemtenga only a minority of clients belonged to the same group as the CHV (Table 5). Moreover this proportion might be expected to decline with time as more non-members hear about the intervention (though there is no significant difference in the proportion of group members among clients between September and November). In Wemtenga practically all the clients knowing their CHV's community organization (two thirds of which is the Mosque) whereas two thirds of the clients in Taabtenga do not know their CHV's community group.

Did the intervention improve the compliance of the treatment of childhood malaria? Compliance in the use of PTU is satisfactory as 65% of the respondents reported having administered for three days, a clear and significant improvement over baseline (Table 6). This compares favorably to the smaller proportion (30%) of self medicated cases at baseline that correctly administered chloroquine for three days.

A second round of training is being considered to improve compliance, though this result, if it proves to be sustainable, is comparable to those of the rural experiment.

Table 6: Client-CHV interaction (Client survey, Sept-Nov 2003)

	Taabtenga		Wemtenga	
	n	%	n	%
CHV explained how to administer the PTU	96	95.0	15	100.0
Client was able to ask questions	76	75.2	14	93.3
Client was satisfied with the answers to his/her questions	67	66.3	14	93.3
Client was satisfied with the service	93	92.1	15	100.0
CHV explained that the chloroquine had to be taken for 3 days	31	30.7	6	40.0
CHV said that it could be harmful to give more than the prescribed dose (unprompted)	23	22.8	7	46.7
CHV said that it could be harmful to give more than the prescribed dose (prompted)	53	52.5	14	93.3
CHV said to take the child to a health center if his health did not improve (unprompted)	38	37.6	13	86.7
CHV said to take the child to a health center if his health did not improve (prompted)	62	61.4	15	100.0
CHV said to take the child to the health center if it still had fever the next day (unprompted)	39	38.6	8	53.3
CHV said to take the child to the health center if it still had fever the next day (prompted)	55	54.5	15	100.0
Child was given the full contents of the packet	71	70.3	14	93.3
Child was not given the full contents of the packet	19	18.8	1	6.7
because child was cured. or only the paracetamol was used*	16	15.8	1	6.7
because child was itching	2	2.0		-
because pills were lost	1	1.0		-
Reasons for not being satisfied		-		-
child vomited the pills	3	3.0		-
child needed syrup	4	4.0		-
child's health did not improve or got worst	4	4.0		-
Child was given the chloroquine dose during three days	69	68.3	13	86.7
Total	101	100.0	15	100.0

*Parent suspected the fever was due to vaccine and bought the PTU for the paracetamol tablets.

Final household survey results

Prevalence of fever among children under seven children in the DSS households was 30% in Taabtenga and 23% in Wemtenga.

Table 7: DSS Population, prevalence of fever in the last 4 weeks and number of children per CHV (final household survey, November 2003)

	Taabtenga	Wemtenga
Number of DSS households with children under 7 years surveyed	482	164
Number of children under 7	784	258
Number of children who had fever in the last 4 weeks	242	59
Prevalence of fever (last four weeks)	*30.9%*	*22.9%*
Number of CHV	11	3
Number of children under 7 per CHV	*71*	*86*
Number of children who had fever in the last 4 weeks per CHV	*22*	*20*

Among children requiring presumptive treatment for malaria, 16,9% (n=242) in Taabtenga and 12,3% (n=57) in Wemtenga were given PTU (see Table 9). A slightly higher proportion of febrile children were given PTU in Taabtenga (17%) than in Wemtenga (12%). This possibility is corroborated by the client survey and will be discussed later.

Table 8: Age and sex of the children reported to have had fever in the last 4 weeks (final household survey, November 2003)

	Taabtenga		Wemtenga		Total	
	n	%	n	%	n	%
child's age						
0-6 months	16	6.6	7	12.3	23	7.7
7-11 months	15	6.2	2	3.5	17	5.7
1-3 years	119	49.2	33	57.9	152	50.8
4-6 years	90	37.2	15	26.3	105	35.1
Male	127	52.5	29	50.9	156	52.2
Female	115	47.5	28	49.1	143	47.8
	242	100.0	57	100.0	299	100.0

Source: UERD, 2003

There are no clear differences in wellbeing in the first four wealth quintiles, and only the fifth quintile can be called characterized as not being 'poor'. The use of PTUs is a higher frequency in the four poorest quintiles than in fifth where only 4,5% of the febrile children were given PTU. The proportion of children treated with PTU increases slightly with age (12% among infants under six months versus 17% among children one year and older).

Table 9: Use of PTU among children who had fever in the last four weeks, according to socio-demographic characteristics (Final household survey, Nov 2003)

Socio-demographic characteristics	n	% used PTU
Wemtenga	57	12
Taabtenga	242	17
Child's age and sex		
0-6 months	23	9
7-11 months	17	12
1-3 years	152	17
4-6 years	105	17
Male	156	17
Female	143	15
Mother's educational attainment		
No schooling	133	14
Primary school	57	23
Secondary or university	61	15
Father's educational attainment		
No schooling	180	17
Primary school	49	20
Secondary or university	15	7
Father's profession		
Salaried employment	34	17
Commerce	64	14
Informal sector	26	19
Other	106	18
Mother's profession		
Housewife	142	18
Salaried employment	16	12.5
Commerce	62	18
Other	12	8
Religion		
Christian	71	14
Moslem	161	18
Other	67	13
Wealth index		
Q1	29	14
Q2	79	28
Q3	111	10
Q4	38	16
Q5 (richest)	22	4.5

DISCUSSION AND CONCLUSION

Results from Taabtenga and Wemtenga show that population-based health strategies are relevant in the periphery of cities and in large isolated slums, but will need to be accompanied in the more central and heterogeneous neighborhoods by more intense marketing methods that still need to be tested.

The principal obstacle to the CBD in both neighborhoods is the legitimacy of the CHV. The CHV requested that PHC and CNRFP assist them in publicizing their link to the official health system. Users and non-users alike stressed that at first the did not trust the CHV because they are not health professionals. CHV could easily be assimilated to illegal street vendors against which the MoH has launched a massive public awareness campaign.

CNRFP and the PHC staff responded to this request by saying that a public awareness campaign was costly and time consuming and would therefore not be replicable. They said that the pilot's objective is to test the feasibility of marketing PTU through existing community groups and that it was therefore up to these groups to demonstrate to the wider community the legitimacy of the CHV and to advertise the sale of PTU.

On the demand side, the relative success in Taabtenga can be explained by a stronger demand for cheap antimalarials and pre-existent self medication practices with generic chloroquine (the same that are contained in the PTU packets).

On the supply side, the success of Taabtenga relative to Wemtenga can be explained by Taabtenga's geographical isolation. The closest PHC is not accessible without a vehicle, and service is poor. The private supply of healthcare is sparse and also of poor quality (see Figure 1). There is therefore little competition for the CHV. In contrast, the Wemtenga Public Health center has a good reputation and is in walking distance of the DSS site, the catholic Saint Camille clinic is not far, and is trustworthy and inexpensive. The competition of legitimate pharmacies and drug peddlers is intense.

The CBD strategy we tested is also more relevant to Taabtenga's demographics. Compared to Wemtenga, Taabtenga is more densely populated and inhabited by a more socially and economically more homogeneous population. This is more conducive to neighborly interactions

and gossip. Moreover, because transportation is difficult in Taabtenga (no public transportation, and few households own vehicles) the community group membership is less dispersed, members live in walking distance from each over. Finally, the density and proportion of children under seven (i.e. eligible for the PTU course) is much larger in Taabtenga than in Wemtenga., so child health is a natural and common concern and an inevitable topic of conversation[8].

These population characteristics have two direct effects on the CBD experiment. First, when the community groups were asked to select two CHV, the project ended up saturating the Taabtenga SSD site and its immediate surroundings with volunteers. The number of CHV per square kilometer was thus much greater in Taabtenga than in Wemtenga, though the number of children under seven per CHV are comparable (Table 7). The second effect of Taabtenga's social fabric is the intensity of communication between its residents, which in turn has two effects: (1) it was more acceptable and easier for the CHV to go door to door and advertise the PTU and (2) the information on the PTU circulated more quickly between the PTU clients. "Word of mouth" marketing is probably the most cost efficient advertising method for a cheap and reliable drug that has an immediate effect. CHV in Taabtenga were encouraged by the results of their efforts and the respect they elicited from their neighbors and friends. Not one single CHV dropped out of the project whereas a third in Wemtenga did not complete more than one sales register.

To conclude UERD is recommending extending PTU strategy to other poor peripheral sites. In the central locations similar to Taabtenga we recommend to test methods to (1) increase CHV credibility and (2) advertise for the correct dosage of chloroquine for home treatment of uncomplicated fever.

[8] Traditional greetings in Burkina is a standard dialogue on health: how is your health? and how is your family's health? and your children's health? etc.

[i] Bodart, C., G. Servais, et al. (2001). "The influence of health sector reform and external assistance in Burkina Faso." Health Policy and Planning 16: 75-86.

[ii] Ministère de la santé (2000). Document de Politique Sanitaire Nationale. Ouagadougou.

[iii] REN-LAC (2000). Etat de la corruption au Burkina Faso. Ouagadougou, REN-LAC: 109.

[iv] UERD (2002). Observatoire de Population de Ouagadougou et les secteurs sociaux de base. Ouagadougou, UERD: 128.

[v] Montgomery, Mark R., Kathleen Burke, Edmundo Paredes. September 1997. Measuring Living Standards With DHS Data. Mimeo, Research Division, The Population Council, New York.

[vi] Davidson R. Gwatkin, Shea Rustein, Kiersten Johnson, Rohini P. Pande, and Adam Wagstaff. Socio-Economic Differences in the Health, Nutrition and Population in Burkina Faso. HNP/Poverty Thematic Group of the World Bank. May, 2002

[vii] Rossi, P. *et al.* 1986 A longitudinal entomological survey on the transmission of malaria in Ouagadougou. *Parassitologia* 28(1): 1-15. In the last 15 years, the central zone of low malaria transmission has grown outwards to include St. Camille and Wemtenga. Meanwhile, a new informal settlement with high malaria transmission has sprung up further east in the area that now includes Taabtenga.

[viii] S.B. Sirima, A Konaté, A.B. Tiono, N Convelho, S. Cousens, and F. Pagnoni, 2003, Early treatment of childhood fevers with pre-packaged anti-malarial drugs in the home reduces severe malaria morbidity in Burkina Faso. *Tropical Medicine and International Health*. 8(2): 133-139.

[ix] Ky, Clothilde et al. 2002, Observatoire de Population de Ouagadougou, Initiative santé urbaine et équité: diagnostic communautaire des quartiers de Taabtenga et Wemtenga, Mimeo Mwangaza Action.