RAPID URBANIZATION AND THE NUTRITION TRANSITION IN SOUTHERN AFRICA

Jonathan Crush, Bruce Frayne and Milla McLachlan

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Contents

Figures

Tables

1. INTRODUCTION

Undernutrition in developing countries has been called the 'silent emergency' and the prospects for eliminating it 'grim.'[1] Although methods for calculating levels of undernutrition vary, the FAO estimates close to one billion people worldwide (14% of the world's population) are undernourished, in the sense that they have insufficient access to energy- and protein-rich foods.[2] Each year around the world an estimated 10 million children under the age of five die from causes that are largely preventable, the majority in developing countries.[3] Nearly 5 million of these deaths are in Sub-Saharan Africa, although child mortality rates have recently fallen in some Eastern and Southern African countries.[4] Poor nutrition contributes to 53% of deaths associated with infectious diseases among children in developing countries. Recent global estimates suggest that at least 10% of children under five show signs of wasting, which indicates acute malnutrition, and 30% are chronically malnourished, which manifests in short stature for age (stunting), with the greatest proportion being in South Asia and Sub-Saharan Africa.[5] This means that 178 million children worldwide are undernourished and are at risk of compromised physical and mental development.[6] Almost all of these children could survive with access to simple and affordable interventions.[7]

In a recent report, however, the World Bank argues that despite decades of interventions, undernutrition still affects at least one third of the developing world's young children.[8] Micronutrient deficiencies and stunting are considered an "extremely serious development issue," particularly in South Asia and Sub-Saharan Africa, and may prevent many countries from attaining the Millennium Development Goals (MDGs).[9] As Chopra and Darnton-Hill point out, "those concerned with nutrition need to more powerfully advocate the role of nutrition in lifting Africa out of the spiral of poverty. To achieve this requires an understanding not just of the critical role of nutrition for health and development (both individual and national), but also of how recent global changes are affecting the nutritional status of women and children."[10]

Rapid urbanization and changing diets in the developing world are now producing a second 'silent emergency' – overnutrition or obesity.[11] While obesity was once associated with rising incomes and industrialised societies, this is no longer the case. The trend is starkly evident in a number of developing countries where incomes are generally much lower than the USA and Europe and yet obesity is growing rapidly (and many times faster than in the industrialized North).[12] A study that tracked nutritional changes in the adult female population in Brazil between 1975 and 1997,

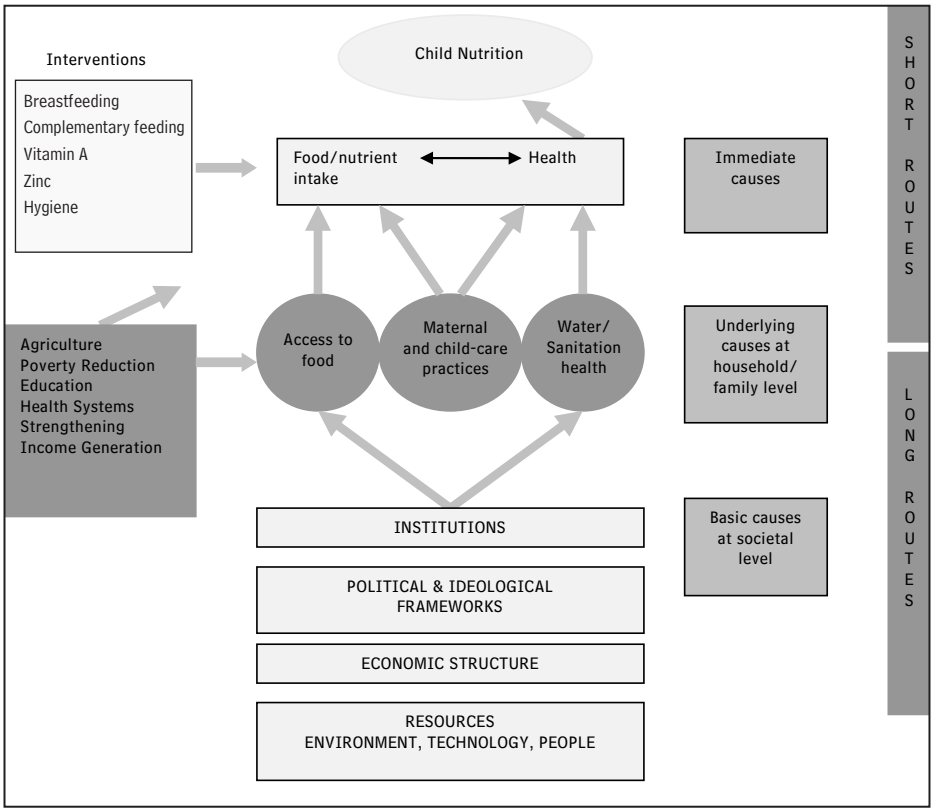
for example, found that obesity increased for low income women and decreased for high income women.[13] Further, Brazilian low-income women carried the double burden of the emerging 'nutrition transition' as they were significantly more susceptible than high income women to both underweight and obesity. Mexico's transition is so far advanced that the country's adult population is now suffering a rural and urban "obesity epidemic," though the problem is more serious in the cities.[14] Studies in India, on the other hand, suggest that the nutrition transition is only in its initial stages and is so far confined to urban, better-off groups.[15]

In Africa, the nutrition transition and the associated 'double burden' of disease is occurring in the context of massive rural-urban migration and rapid urbanization.[16] There is a growing consensus that this situation poses one of the major threats to public health in the developing world, and that it impacts the poor – and therefore the most food insecure – to the greatest extent. This paper reviews the state of knowledge about food insecurity and the double burden of nutrition in the urban areas of Southern Africa and lays out an agenda for future research to fill significant knowledge gaps. It also discusses the implications for policy making on health, food security and urban planning in the region.

2. Food Insecurity, Undernutrition and Health

Malnutrition is more often associated with rural than urban areas in Africa. Nevertheless, urban food insecurity and undernutrition are growing rapidly under conditions of rapid urbanization. The rural-urban gap also seems to be narrowing.[17] In urban areas, however, food availability is seldom the key factor contributing to undernutrition.[18] Rather, food inaccessibility, especially for children, combined with inadequate access to health services, poor sanitation and care are the leading causes of undernutrition (see Figure 1).[19] The urban poor are exposed to both acute and chronic problems of food access – often on an ongoing basis – thus impacting nutritional status negatively at all stages of the life cycle, from conception to adulthood, and also in old age.

FIGURE 1: Child Nutrition and Interventions



Source: Ruel, "Addressing the Underlying Determinants of Undernutrition."

The problems of food access in the urban areas of the Southern African are graphically illustrated in AFSUN's recent baseline survey of poor communities in 11 cities in 9 different countries.[20] To measure the extent of food insecurity arising from the lack of access to food, the survey used FANTA's Household Food Insecurity Access Prevalence (HFIAS) scale, a reliable composite measure of the degree and frequency with which households go without food.[21] In some cities, over 60% of households in sampled poor communities were severely food insecure (Table 1). These included Manzini (79%), Harare (72%), Lusaka (69%), Cape Town (68%), Maseru (65%), Gaborone (63%), Windhoek (63%) and Msunduzi (60%). In only two cities (Blantyre and Johannesburg) were less than 30% of the households in the selected communities severely food insecure. However, when severely and moderately food insecure households were combined, the figures for these two cities rose to 51% and 42% respectively. In Harare, 96% of the poor households were severely or moderately food insecure, followed by Lusaka (93%), Manzini (92%), Maseru (90%), Msunduzi (87%), Maputo (86%), Gaborone (82%) and Cape Town (80%).

TABLE 1: Household Food Insecurity Prevalence in Poor Communities

	Windhoek	Gaborone	Maseru	Maputo	Manzini	Blantyre	Lusaka	Harare	Cape Town	Msunduzi	Johannesburg	Total
Food secure	18	12	5	5	6	34	4	2	15	7	44	17
Mildly food insecure	5	6	6	9	3	14	3	3	5	6	14	7
Moderately food insecure	14	19	25	32	13	30	24	24	12	27	15	19
Severely food insecure	63	63	65	54	79	21	69	72	68	60	27	57
Total	100	100	100	100	100	100	100	100	100	100	100	100

The HFIAS scale is based on answers to nine frequency-of-occurrence questions in relation to food access experienced by the household. A breakdown of the answers to the questions provides further insights into the major forms of food inaccessibility (Table 2). A total of 45% of households often (17%) or sometimes (28%) worry about not having enough food (Q1). Only a third (30%) never have such worries. However, fewer households had actually experienced food shortages over the previous month (9% said they often did not eat at all, 6% that they often went to bed hungry because there was not enough food and 5% that they had often gone without food for a day and a night) (Q7-9). These responses might suggest that more households feel vulnerable to food shortages than actually experience them in practice. Since many more households had "sometimes" experienced food shortages over the course of the previous month, though, it suggests that the fairly widespread perceptions of vulnerability to hunger reflect a lack of food security. In some cities, the proportion of households that often experience absolute shortages of food is much higher. In poor communities in Manzini, for example, as many as 28% of the households said they often had no food to eat at all. And 36% often ate fewer meals because of a shortage of food. In Harare, that figure was as high as 40%.

Another dimension of food insecurity is the strategies that households adopt in response to food shortages or a lack of resources to purchase food (Table 2). These strategies include eating fewer meals and reducing the amounts eaten. Across the study population, 16% of households said they had often eaten fewer meals in the previous month because of a lack of resources to purchase food. Another 25% sometimes did so. Only 35%

had never done so. Seventeen percent of households often ate smaller meals and another 27% sometimes did so. Only a third never did so. On both of these adaptive responses, the figures were again extremely high in some cities. Those often eating fewer meals included 40% of households in the poor communities of Harare, 36% in Manzini, 19% in Maseru and 14% in Maputo. Those often eating smaller meals included 39% of households in the Harare and Manzini study areas, 22% in Maseru and 15% in Lusaka.

A third aspect of food insecurity is the effect of inaccessibility on the quality of household diets (Q2-4 in Table 2). Here, the overall frequencies of occurrence were higher than for any other measures. More specifically, around a fifth of all households said they are often unable to eat their preferred foods; have a much less diverse diet; and ate food they did not like purely because the household lacked the resources to purchase desired foods. Another 30% of households are sometimes in this position while only a quarter never have to eat foods that they do not like.

TABLE 2: Household Experience and Responses to Food Shortages

	Often	Sometimes	Rarely	No
1. Worry about not having enough food	17	28	25	30
2. Unable to eat preferred foods because of lack of resources	21	32	24	23
3. Had to eat a limited variety of food because of lack of resources	20	30	24	26
4. Had to eat food did not want to eat because of lack of resources to purchase other food	21	30	24	25
5. Had to eat smaller meal than needed because there was not enough food	17	27	24	32
6. Ate fewer meals in a day because not enough food	16	25	24	35
7. No food at all to eat due to lack of resources	9	19	23	49
8. Went to sleep hungry because there was not enough food	6	14	19	61
9. Went a day and a night without eating because there was not enough food	5	11	17	67

Little progress has been made in Southern Africa towards meeting the Millennium Development Goal (MDG) target of reducing hunger by half by 2015.[22] Very little improvement has been documented in such common indicators of undernutrition as low birthweight and stunting

of children.[23] The absolute number of underweight children has actually increased in the region over the past 15 years. The proportion of newborns with low birthweight varies from 9-17% in SADC with most countries in the 11-15% range (Table 3). The average rate for developing countries is estimated to be 11%, whereas it is 6% in industrialized countries. The goal (established at the World Summit for Children) is that less than 10% of infants would have low birthweights. Only Swaziland reported a rate within this range. South Africa, the wealthiest (and most unequal) country in the region, has the third worst score (only Madagascar and Namibia are worse) equal to Mozambique. Many poorer countries – such as Angola, Botswana, the DRC, Lesotho, Malawi and Swaziland – have better rates. Low birthweight is an indicator of both fetal health and maternal nutritional status. The high prevalence rates in the SADC region suggest than maternal health and nutritional status require urgent attention. In every country, the proportion of underweight children is higher in rural than urban areas although the differences are marginal in Lesotho, Malawi, Swaziland and Zambia. The differences are marked in the DRC, Mozambique, Tanzania and Zimbabwe.

TABLE 3: Child Nutrition Indicators in SADC

	Low Birthweight %	Moderate & Severe Underweight %	Moderate & Severe Wasting %	Moderate & Severe Stunting %	Child Underweight Urban %	Child Underweight Rural %	Underweight in Lowest Two Income Quintiles %
Angola	12	16	8	29			
Botswana	10	13	6	29			
DRC	12	31	9	45	19	29	56
Lesotho	13	14	2	42	12	13	
Malawi	13	21	4	53	14	15	33
Madagascar	17	42	15	53			
Mauritius	14	15	12	32			
Mozambique	15	18	4	44	14	20	48
Namibia	16	21	8	29	12	19	43
South Africa	15	12	5	27			
Swaziland	9	7	3	29	7	8	
Tanzania	10	22	4	44	12	18	
Zambia	11	19	5	45	13	15	32
Zimbabwe	11	17	7	33	9	13	28

Low Birthweight: % of babies weighing <2,500g (5lb 8oz),
Underweight: Low weight for age (0-5 years old)
Wasting: Low weight for height (0-5 years old), Stunting: Low height for age (0-5 years old)
Source: UNICEF, 2010

The proportion of children who are moderately or severely underweight increases with age in almost all countries, in some cases quite dramatically (e.g. in the DRC from 12% of newborns to 31% of children under 5; in Madagascar from 17% to 42% and in Tanzania from 10% to 22%). The only two countries where it drops are Swaziland (from 9% to 7%) and South Africa (from 15% to 12%). In every single country, more than a quarter of children under 5 are moderately or severely stunted. In some countries (DRC, Lesotho, Malawi, Madagascar, Mozambique, Tanzania and Zambia) over 40% are stunted. In South Africa, almost one quarter of children under five are stunted. Since 1990, the stunting rate has decreased only slightly, from 35.4% to 33.3%. By contrast, rates in South-East Asia have declined substantially from 47% to 29.4%.[24]

Child underweight is positively correlated with household income. In the six countries for which there is data, a significant minority of underweight children are from households in the lowest income brackets (ranging from 28% in Zimbabwe to 56% in the DRC). Rates of child malnutrition are also generally higher in rural than urban areas.[25] However, UNICEF reports that the urban-rural gap may be closing.[26] This trend is probably the consequence of rising urban poverty associated with urbanization. As malnutrition rates are generally reported at the city rather than the neighbourhood level, it is likely that levels are disproportionately higher in low income and slum areas and may even exceed levels in rural areas.[27]

A number of case studies have examined the outcomes of early childhood malnutrition in Southern Africa. One study in Zimbabwe examined the longer-term impact of infant stunting on physical and social development outcomes.[28] The study concluded that if the median child in the study had the stature of a median child in a developed country, by adolescence she would be 3.4 centimetres taller, completed an additional 0.85 grades of schooling and commenced school six months earlier. Even within the context of Zimbabwe, children that were exposed to these food shocks at a young age did not fully recover and remained shorter than their peers who had received adequate nutrition in their early years.[29]

Another study in Botswana examined the levels of wasting, stunting and underweight (the three common indicators of malnutrition) among children under 3 years old in a national sample of 400 households.[30] More than half (53.3%) of the households studied had monthly incomes below Pula 400 (equivalent to US $87 at the time), which put them in the poorest stratum of society. The study found that malnutrition affects 5.5% (wasting), 38.7% (stunting), and 15.6% (underweight) of children under three years of age and is positively correlated with household income.[31] On all three measures, infant boys were more malnourished than girls.

Children of single mothers and less-educated parents were also more malnourished, as were those whose parents engaged in informal sector business as opposed to agriculture. Children with working mothers were less malnourished. Maternal education and breastfeeding also produced better outcomes. Children in poorer households were more malnourished and rural children were reportedly more malnourished than urban (though the published study provided no data to support this conclusion).

In South Africa, significant resources have flowed to nutritional support programmes. However, studies show that several conditions have worsened over the past ten years.[32] South Africa remains significantly above the 1990 World Summit for Children's goal of having less than 10% of children born with low birthweight.[33] The 2005 National Food Consumption Survey-Fortification Baseline (NFCS-FB) reported that the national prevalence of stunting, underweight and wasting were 18%, 9.3%, and 4.5% respectively.[34] There is also some evidence that the nutritional status of poor children is worse in male-headed households and better when mothers are in employment and when children are raised by their parents rather than grandparents or other relatives.[35] While there has been a modest reduction in the prevalence of stunting and severe stunting between 1999 and 2005, notably in rural areas, the prevalence of wasting and severe wasting has increased in urban areas.[36] Although further research is required to better understand this trend, it is likely that the persistence of urban poverty and the ongoing urbanization process are responsible for deteriorating conditions in South African cities. Similar trends are likely to occur in other SADC towns and cities.

The combination of macro- and micro-nutrient deficiencies leads to malnutrition and long-term impacts at all stages of the life cycle. Intrauterine growth retardation (IUGR) occurs when the pregnant mother is malnourished and unable to supply the required nutrients to the unborn child. In addition to food and nutrient intake, additional contributory factors resulting in IUGR include diarrhoeal disease, intestinal parasites, and respiratory infections, as well as malaria.[37] Once the child is born, the first two years of life are critical to full development. Stunting is associated with higher rates of illness and death, reduced cognitive ability and school performance in children and lower productivity and lifetime earnings for adults.[38] Without the appropriate nutrition at all stages of this initial period, physical and mental development is retarded. These negative effects are largely irreversible, making it essential to focus interventions on the 'window of opportunity', namely pregnancy and the first two years of life.[39]

Breast milk is the single most important food in the first two years of life,

providing the correct ratios of macro- and micro-nutrients to the growing baby, while also ensuring full development of the immune system. Research has shown that exclusive breast feeding during the first six months of life is the optimal form of infant feeding.[40] In developing countries, non-exclusive breast feeding accounts for 1.4 million child deaths per year, and is a direct risk factor for undernutrition.[41] Studies show that mixed feeding in very young infants increases the risk of infectious diseases and malnutrition.[42] Trend data for Sub-Saharan Africa suggests that exclusive breast feeding rates doubled in the period between 1990 and 2004, from 15% to 32%.[43] In Southern Africa, rates vary considerably, from 56% in Malawi to 8% in South Africa.[44]

Micro-nutrient malnutrition is also a very important dimension of the food security and nutrition dynamic. Micronutrient malnutrition affects one in every three persons living in Sub-Saharan Africa. Women and children are the most severely affected particularly by deficiencies of iron, iodine and Vitamin A. Iodine deficiency disorders (IDD)[including goitre] and Vitamin A deficiency (VAD) are widespread. Vitamin A deficiency causes blindness, and deficiencies in Vitamin A and zinc combined are responsible for about three million deaths each year.[45] Moderate Vitamin A deficiency affects about 163 million (30%) young children worldwide, with the highest prevalence rates observed in Central and West Africa. Although rates in Southern African declined from 37% in 1990 to 25% in 2007, countries in the sub-region are unlikely to halve the prevalence of Vitamin A deficiency between 1990 and 2015.[46]

There is a strong relationship between the consumption of iodised salt and goitre prevalence rates. Worldwide, 68% of households are now consuming iodized salt, and goitre prevalence has shown a remarkable decline, to between 10% and 20%, involving approximately 700 million people, between 1990 and 2007. The decline in Southern Africa has been more modest, from 35.5% to 33.1%, although 72% of households in the region report using iodized salt. In Lesotho, however, the proportion of the population with low urinary iodine levels declined from 100% to 21.5%, and goitre rates from 16.2% to 4.9%.[47] If there had been no salt iodisation, it is estimated that some 2 million people worldwide would have succumbed to the devastating impact of a lack of iodine in the diet.

Diet-related iron deficiency contributes to as much as half of all anaemia, with prevalence rates in Africa of 30% to 50% in pregnant women and lactating mothers, and 20-30% in children under five years of age.[48] A recent review of available trend data on anaemia among adult women found a deteriorating trend in several African countries (including Lesotho). Few studies were done on anaemia in children before 1995.

More recent studies suggest that the problem is more widespread than anticipated, with anaemia rates of over 60% recorded in some African countries. Given the link between iron deficiency and cognitive development in children, and the links between anaemia and iron deficiency, the high rates of childhood anaemia are of particular concern from the perspective of education and human capital development.[49]

A 2008 study in Lusaka investigated whether poor-quality complementary foods with low nutrient density and inappropriate feeding practices contribute to malnutrition in young children.[50] Common complementary foods in developing countries are unfortified cereal-based gruels characterised by low energy and nutrient density. These foods are often inadequate in iron, zinc and pyridoxine and may be deficient in riboflavin, niacin, calcium, thiamine, folate, ascorbic acid and Vitamin A. The child's food was determined by what was available in the household, the cost of food and seasonality. Maize-meal-based porridge was the main form of food for infants. The results showed that although mothers had wide knowledge of optimal infant feeding, actual practices were constrained by food cost, maternal HIV status and time availability. Compared with the recommended daily allowance (RDA) at 6-8, 9-11 and 12-18 months of age, the daily nutrient intakes were 88%, 121% and 94% for energy; 33%, 52% and 59% for iron and 30%, 33% and 38% for calcium, respectively. The study concluded that the fortification of complementary foods would be necessary to meet infants' needs for iron and calcium. Even though processed complementary foods were available, their use for feeding infants was restricted by high prices.

Mental health has tended to be viewed as less important than physical health in relationship to poverty and food insecurity, but this is beginning to change.[51] As many as 121 million people are affected by depression worldwide, and this is a major cause of disability.[52] Although this figure is expected to increase, fewer than 25% of those currently affected have access to adequate treatment and health care. While the relationship between poverty and mental illness has been well documented in industrial countries, little is known about the links in developing countries. Evidence gathered from a set of 11 studies carried out in six low income countries (Lesotho, Zimbabwe, Indonesia, Pakistan, Brazil and Chile) indicated that the median prevalence rates of common mental disorders varied from 20% to 30%. Moreover, ten studies showed a statistically significant relationship between prevalence of mental disorders and indicators of poverty, including low educational levels, low income, lack of material possessions, lack of employment, and housing difficulties.[53] Although data was captured from both rural and urban samples, the study did not focus on urban-rural differences. Nonetheless, an earlier study in

Khartoum, Sudan, found that mental disorders were found to be more widespread than in rural areas.[54]

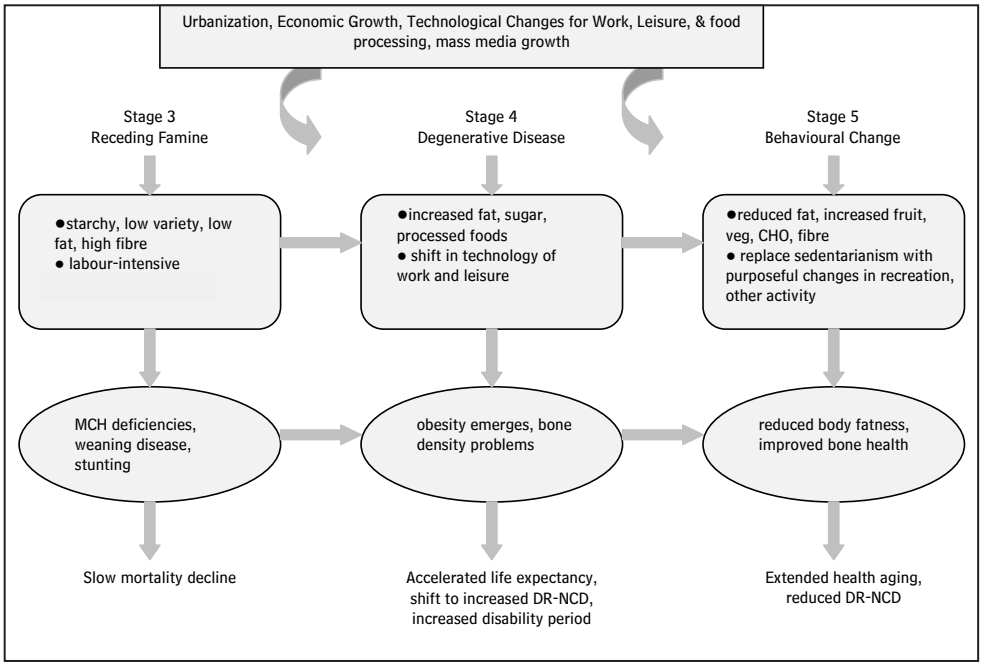
The relationships between urban food security, nutrition and mental health require additional investigation. A 2009 review of the literature concluded that "little work has examined these issues directly, and serious methodological flaws are present in many of the existing studies."[55] Work in rural Tanzania and Ethiopia has drawn direct connections between food insecurity and mental health problems such as anxiety and depression.[56] In South Africa, a national survey of over 4,000 adults asked a single food insufficiency question which was cross-tabulated with psychiatric diagnosis findings from the WHO Composite International Diagnostic Interview Survey. The study found that food insecurity was independently associated with having a 12-month and lifetime DSM-IV (Diagnostic and Statistical Manual of Mental Disorders) diagnosis, a finding that "has implications for reducing the burden of common mental disorders in South Africa since, unlike a number of major risk factors for mental illness, food insufficiency may be relatively amenable to intervention."[57] In the specifically urban context, a study of children in townships around Cape Town has examined associations between AIDS-orphanhood status, poverty indicators, and psychological problems.[58] The study concluded that AIDS orphans had more psychological problems including depression, peer problems, post-traumatic stress, and conduct problems. While food security, access to social welfare grants, employment in the household and access to school were associated with better psychological health, "food security showed the most consistent association with reduced psychological problems."

3. A New Epidemic? Over-nutrition in Southern Africa

Rapidly-urbanizing developing countries are undergoing a major 'nutrition transition.'[59] Popkin's influential model suggests that the transition typically follows a number of distinct stages (Figure 2). Rapidly-urbanizing developing countries are generally moving from Stage 3 towards Stage 4 of the transition, with the co-existence of malnutrition and obesity, which disproportionately affects the poor. Given the speed of urbanization and the considerable population growth expected in the cities of the developing world over the coming decades – some 3 billion by mid-century – the double burden of disease threatens to overwhelm the capacity of the health care system and other social services in many

countries.[60] Food and nutrition security is centre-stage in this transition, with access to good, healthy food being critical to the ability of the urban poor to move towards Stage 4 and a more productive and long life.[61]

FIGURE 2: Later Stages of the Nutrition Transition



Source: Popkin and Gordon-Larsen, "The Nutrition Transition."

Popkin and Gordon-Larsen describe the nutrition transition as follows:

> Over the past 15 years, there has been increasing evidence that the structure of dietary intakes and the prevalence of obesity around the developing world have been changing at an increasingly rapid pace. In many ways, these shifts are a continuation of large-scale changes that have occurred repeatedly over time; however … the changes facing low- and moderate-income countries appear to be very rapid. While initially these shifts were felt to be limited to higher-income urban populations, it is increasingly clear that these are much broader trends affecting all segments of society. Two historic processes of change occur simultaneously with, or precede, the 'nutrition transition'. One is the demographic transition - the shift from a pattern of high fertility and mortality to one of low fertility and mortality (typical of modern industrialized countries). The second is the epidemiological transition … : the shift from a pattern of high prevalence of infectious disease - associated with malnutrition, periodic famine, and poor environmental sanitation - to one of high prevalence of chronic and degenerative disease - associated with urban-industrial lifestyles.[62]

Despite the overwhelming evidence for undernutrition in Africa, there are growing indications that overnutrition is affecting the continent as well. A recent review of 28 studies in West Africa, for example, found an overall obesity prevalence of 10% and higher rates among adult women and in urban areas.[63] The prevalence of obesity in urban West Africa had more than doubled in the previous 15 years. Another review of seven countries in West and East Africa found that the prevalence of urban overweight/obesity increased by nearly 35% between 1992 and 2005.[64] The increase was higher among poorer (50% rise) than wealthier (7% rise) socio-economic groups. There was also an increase of 45-50% among non-educated and primary school-educated women, compared to a drop of 10% among women with secondary education or higher. Evidence of an urban nutrition transition has also been reported in many individual African countries.[65] Overnutrition and undernutrition are often both present in the same community and even within the same household, leading researchers to propose the notion of "dual burden" households.[66]

In Southern Africa, most of the research on overnutrition has been conducted in South Africa. The evidence suggests that South Africa is tracking rapidly from Stage 3 to Stage 4 of the nutrition transition. The transition is certainly more advanced in South Africa but there is every reason to suppose that the other countries will follow suit. The double burden is clearly present in South Africa's adult population, although there is considerable variation by age, race, sex and location (urban versus rural). The 2008 National Income Dynamics Survey (NIDS), for example, found that levels of underweight (as measured by the Body Mass Index) are generally higher for males than females (12% versus 5%) and levels of obesity are higher amongst females (11% versus 36%) (Tables 4 and 5).[67] These sex differences in underweight and obesity hold for almost all categories of age, education and location.

The highest rates of underweight amongst both men (20%) and women (7%) are in the 15-24 age group. Rates decline with age for both sexes, suggesting that people eat better when they start to fend for themselves. Obesity rates, on the other hand, increase with age, reaching a maximum of 51% of females aged 45-54 and 20% of males aged 55-64. Not unexpectedly, given the history of racial discrimination and inequality in South Africa, rates of underweight and obesity vary significantly by race. Amongst males, rates of underweight are highest amongst Coloured men (17%), followed by Asian (16%), African (13%) and White (2%) men. In contrast, rates of obesity are highest among White men (23%), followed by Coloured (17%), Asian (11%) and finally African (7%) men. Rates of female obesity climb rapidly after the age of 25. Women present a different

picture with rates of obesity among African, Coloured and Asian women much higher than among White women.

Comparing urban and rural locations, the problem of underweight is more prevalent in rural areas (16% of rural men and 5% of rural women are underweight, compared with 10% of men and 4% of women in urban areas). The problem of obesity is more serious in urban areas (13% of urban men and 36% of urban women are obese, compared with 7% of men and 29% of women in rural areas). In general, underweight is more serious among men and obesity among women. In addition, obesity is clearly not just an urban problem in South Africa. Finally, NIDS allows us to see if there is any relationship between the double burden and socio-economic status. In the case of men, the prevalence of underweight clearly declines as income increases. Amongst men, for example, 18% of men in the lowest income quintile are underweight compared with only 5% of men in the upper quintile. On the other hand, obesity increases with increased income (from 6% of men in the lowest quintile to 19% in the upper quintile). The relationship between income and nutritional status exists but is much weaker amongst women (6% of women in the lowest quintile are underweight compared with 2% in the upper quintile; and 26% of women in the lowest quintile are obese compared with 30% of women in the upper quintile).

TABLE 4: Nutrition Profile of South African Male Population, 1998-2008

	Underweight SAHDS 1998 (%)	Obese SAHDS 1998 (%)	Underweight NIDS 2008 (%)	Obese NIDS 2008 (%)
Age				
15-25	21.6	2.4	19.5	3.9
25-34	8.6	7.5	6.6	9.0
35-44	8.6	12.9	8.7	13.3
45-54	9.3	17.1	11.2	20.8
55-64	9.1	14.7	7.2	21.8
>65	10.0	13.5	10.3	18.9
Race				
African	14.1	7.6	12.6	9.0
Coloured	11.7	9.4	17.5	13.3
White	4.9	20.2	1.8	22.9
Asian	16.6	9.0	16.5	18.1
Location				
Rural	16.5	6.0	15.6	7.2
Urban	11.0	11.0	9.8	13.3

Income				
Q1			17.8	5.9
Q2			17.3	5.3
Q3			16.8	7.3
Q4			11.2	9.5
Q5			4.9	19.1
Total	13.1	9.2	12.1	10.9

TABLE 5: Nutrition Profile of South African Female Population, 1998-2008

	Underweight SAHDS 1998 (%)	Obese SAHDS 1998 (%)	Underweight NIDS 2008 (%)	Obese NIDS 2008 (%)
Age				
15-25	9.7	8.9	7.5	13.3
25-34	5.4	26.3	4.0	28.7
35-44	2.7	38.9	2.8	45.0
45-54	4.0	44.9	2.8	50.9
55-64	2.7	45.2	3.1	46.2
>65	7.7	32.3	3.8	45.8
Race				
African	5.1	30.7	4.6	32.7
Coloured	10.3	28.0	6.5	35.7
White	15.3	27.6	4.9	38.7
Asian	3.0	21.4	2.0	24.4
Location				
Rural	6.7	26.9	5.3	29.4
Urban	5.1	26.4	4.0	36.0
Income				
Q1			5.8	26.3
Q2			5.5	24.9
Q3			4.3	24.0
Q4			4.9	26.4
Q5			2.1	30.0
Total	5.7	26.6	4.6	36.0

The NIDS and earlier South African Health and Demographic Surveys (SAHDS) provide an opportunity to track changes in undernutrition and overnutrition over the last decade.[68] The 1998 SAHDS and 2008 NIDS data for undernutrition and overnutrition provide evidence of several

shifts and trends over the last decade (Tables 4 and 5). First, amongst both men and women there has been a small fall of around 1% in the proportion of adults who are underweight (from 13% to 12% in the case of men and from 6% to 5% in the case of women). In both groups, the fall was greatest amongst people under the age of 35. The fall occurred in both urban and rural areas and amongst almost all racial groups (the only increase being amongst Coloured men). Second, there was an increase in obesity (from 9% to 11% of men and from 27% to 36% of women). In every age group, male and female, obesity increased by 1-12%. Obesity also increased in every racial group and in both rural and urban areas. The increase was greater in urban than rural areas, however (from 11% to 13% of urban men and from 26% to 36% of urban women; compared to rural increases of 1% amongst men and 2% amongst women).

Urban case study evidence confirms these general findings. A study of elderly (over 60) residents of Sharpeville, for example, found that 84% of the women were obese despite evidence of chronic food insecurity.[69] The study concluded that "poverty, malnutrition, both undernutrition and overnutrition, as well as household food insecurity and poor health were the major problems observed in this elderly community." Another study in Khayelitsha, Cape Town, found that the prevalence of overweight/obesity was 53% among women and 19% among men, despite the fact that women were physically more active than men.[70] A separate Cape Town study found that women who were nutritionally deprived as children were significantly more likely to be obese as adults, while men who were deprived as children faced no greater risk. Women of higher adult socioeconomic status were also significantly more likely to be obese, which was not true for men.[71] Amongst high-school children, there is strong evidence of both undernutrition and overnutrition.[72] Finally, a direct link has been suggested between the nutritional status of adults and children in the same household. A study using data from the 2005 South African National Consumption Study shows that obese and overweight mothers have significantly more overweight children than non-obese mothers and significantly less likely to have stunted or underweight children.[73] Underweight women and stunted women were significantly more likely to have underweight and stunted children, respectively. The NIDS shows that obesity and undernutrition can co-exist within the same household. In 45% of households with a stunted child, for example, there is at least one obese adult and in 37% of households where there is an underweight child there is at least one obese adult. In more than one in eight South African households there is both an over-nourished adult and an under-nourished child.[74]

The 2008 NIDS provides national data on the state of the double burden

amongst South African children. Here we see higher rates of undernutrition than amongst adults (Table 6).

TABLE 6: Nutrition Profile of South African Children, 2008

	Underweight NIDS 2008 (%)	Obese NIDS 2008 (%)
Sex		
Male	14.3	9.5
Female	12.8	10.5
Age		
0-4	8.3	15.6
5-9	14.1	7.0
10-14	17.4	9.0
Race		
African	13.3	9.8
Coloured	12.8	14.6
Indian	22.4	2.4
White	14.9	9.9
Location		
Rural	14.9	8.8
Urban	12.3	11.3
Income		
Q1	14.2	8.3
Q2	14.9	9.0
Q3	12.8	10.9
Q4	13.5	11.2
Q5	11.0	13.4

In total, 14% of male children and 13% of female children are underweight (compared with 12% and 6% of male and female adults). Underweight increases markedly with age (from 8% of those under 4 to 17% of those between 10 and 14), suggesting that children may have access to less of the food they need as they get older. A greater proportion of rural than urban children are undernourished but the urban incidence is still relatively significant (12%) and higher than for urban adults. The other notable, and not unexpected, finding is that undernutrition declines with household income: 14% of those in the lowest quintile are underweight compared with 11% in the highest quintile. Obesity rates are quite similar amongst male and female children (9% and 10% respectively) and much lower than for adults. Child obesity is highest amongst Coloureds and lowest among Indians. Rates of childhood obesity are very similar for White and Black children. Children in urban areas also have higher rates

of obesity than rural children, although obesity is far from absent in rural areas.

Nutrition and urban lifestyle-related diseases include diabetes, cardiovascular heart disease, hypertension, asthma, cancer and mental illness (especially depression). Dietary quality has therefore become a very important health issue in the context of rapid urbanization and the nutrition transition. The double burden of disease illustrates the very real consequences of dietary changes in urban contexts. Steyn suggests that there are four distinct types of diet in South Africa: the Western South African diet; the rural African diet; the urban township diet; and the urban Indian diet.[75] In practice, there is growing overlap and inter-penetration of these dietary types. Urbanization, globalization, the expansion of supermarket chains, the increased availability of processed food, the "fast food" revolution and junk food are all making it more difficult to speak of discrete dietary types in Southern Africa, although more research on dietary intakes would help to test this proposition.

Individual and household income is a critical determinant of food accessibility in urban contexts. As a general statement, we might expect that a rise in income would result in greater access to food and better nutrition profiles amongst the urban poor. Increases in income do, in general, result in greater spending on food, especially by increasing variety and including higher value foods such as fruit, vegetables and animal products. Wealthier households also spend more per calorie than poorer households. However, whether or not increased spending on food improves nutritional status amongst poorer urban households is a question that has not been adequately addressed and needs further research.[76] While higher value foods may be preferred, the levels of food processing and convenience foods that prevail in urban food markets mean that greater diversity may not result in improvements in nutritional quality (and may even result in a deterioration of nutritional status).[77]

Obesity is the result of the over-consumption of calories and a decrease in physical activity. However, the picture is more complex than simply over-eating. In some urban food markets, the industrial food processing and supply system has replaced traditionally nutritious foods (still available in many rural areas) with nutritionally inferior, energy-dense but cheaper foods and drink.[78] In addition to being nutritionally poor, these cheaper foods typically comprise highly refined, low fibre cereals, fats (and especially trans fatty acids) and sugar.[79] The so-called 'Western diet' is associated with many non-infectious health conditions and diseases that are already reaching epidemic proportions in high-income countries. They are now also emerging in developing countries and the burden of

non-infectious disease is increasingly being carried by the urban poor in these societies.

Studies have shown that lower calorie, nutrient-dense, less-processed foods such as fruits and vegetables generally do cost more, and that cost is a barrier to the urban poor.[80] Less healthy versions of particular foodstuffs also tend to cost less. A recent study of food prices in 14 small towns in the Western Cape in South Africa, for example, compared the prices of six commonly consumed foods with healthier versions of those foods (e.g., whole-wheat bread versus white bread).[81] Healthier foods cost between 10% and 60% more when compared on a weight basis and between 30% and 110% more when compared based on the cost of food energy. For a household of five occupants, the increased expenditure on food by eating a healthier diet would be over R12,000 per annum, a high proportion (>30%) of the total household income for most of the population.

While underweight people are generally malnourished in a developing world context, it is also possible for overweight and obese people, who rely on a diet of refined carbohydrate, fat and sugar, to be malnourished. In Southern African cities, more research on the quality of diets and dietary diversity is therefore required to establish both the levels and the quality of macro- and micro-nutrient intake amongst the urban poor.[82] A recent national study of dietary diversity amongst adult South Africans reported that the lowest dietary diversity was found in the predominantly rural areas of Limpopo and the Eastern Cape and the highest in the more urbanized Western Cape. Dietary diversity is also particularly low in urban informal areas across the country.[83] Empirical studies in the "poverty stricken and chronically food insecure" urban informal settlement of Sharpeville provides some local-level support for this general observation.[84] Although elderly residents of the community consume two or three meals a day, dietary diversity is low and the diet is dominated by carbohydrate-based and nutrient-deficient foods.[85] Women caregivers in the informal settlement also experience poor dietary quality with food intakes deficient in all nutrients except carbohydrates.[86]

In its baseline survey of Southern African cities, AFSUN collected data on the diets of poor urban households in 11 SADC cities using FANTA's Household Dietary Diversity Scale (HDDS).[87] The HDDS refers to how many food groups are consumed within the household over a given period (in this case, the previous 24 hours) and scores range from 0 to 12. The study showed that dietary diversity was inadequate for most households in the sample, with a median value of only 5 (indicating that people were eating food from only five different food groups.) If non-nutritive food items such as sugar and beverages are removed, the median dietary

diversity score drops to three. Around 35% of households ate from 4 or fewer food groups and nearly 50% from 5 or fewer food groups (Table 7). The dominant food type is starchy staples (consumed in 96% of households). Less than half of the sample ate any form of animal protein. Nearly two thirds of the households consumed some form of vegetable but less than one third consumed any fruit.

TABLE 7: Household Dietary Diversity in Regional Sample

HDDS	% of HH	Cum %
0	1	1
1	2	3
2	11	14
3	10	24
4	11	35
5	14	49
6	13	62
7	12	74
8	10	84
9	7	91
10	4	95
11	2	97
12	3	100
N	6,184	

Dietary diversity, like other aspects of food insecurity, varies from city to city in the region. Three distinct patterns emerged from the survey data (Table 8). First, the South African cities plus Windhoek, Gaborone, Maputo and Blantyre have very similar dietary diversity patterns with around 35-45% of households having HDDS scores of 5 or lower. Secondly, households in Lusaka and Harare have much lower dietary diversity. In these two cities, 60% of households score 5 or lower. Worse off still are households in the third group, comprising Manzini and Maseru. In Manzini, 76% of households have an HDDS score of 5 or less. In Maseru, the worst off of all, the figure is 84%.

TABLE 8: Household Dietary Diversity by City

HDDS	Wind-hoek	Gabo-rone	Maputo	Blantyre	South Africa*	Lusaka	Harare	Maseru	Manzini	Region
	Cum %	Cum %	Cum %	Cum %	Cum %	Cum %	Cum %	Cum %	Cum %	Cum %
0	0	0	1	0	1	1	0	1	2	1
1	2	5	1	1	3	2	1	8	6	3
2	8	10	4	4	7	19	14	42	33	14
3	20	16	11	10	13	31	29	63	48	24
4	28	22	29	22	23	45	48	74	62	35
5	43	32	47	40	36	61	66	85	76	49
6	59	43	68	60	50	79	79	91	83	62
7	72	63	83	76	63	88	87	96	90	74
8	84	77	92	89	74	96	95	98	97	84
9	92	87	97	95	86	100	98	99	98	91
10	96	92	99	100	92		99	99	99	95
11	99	94	100	100	96		100	99	100	97
12	100	100			100			100		100
*Cape Town, Johannesburg, Msunduzi										

While cost is a critical determinant of the food choices of the urban poor, cultural and other social factors also play a role. The media and advertising contribute to shaping food preferences and choices, creating a powerful wave of dietary change, affecting both the quantity and quality of food eaten. This fundamentally alters consumption and nutrition outcomes in urban areas. For the urban poor, many of these changes are negative. The desire for so-called 'status' foods and 'aspirational' foods is a powerful driver of food choices.[88] Linked specifically to the fast food industry, low income people aspire to the culture of apparent sophistication that brand eating promises, often with negative health outcomes. In addition to media and advertising influences, the urban poor appear to face considerable infrastructural obstacles to eating a healthy and adequate diet. Time constraints, limited access to retail outlets and neighbourhood markets and the lack of cooking, refrigeration and storage facilities in many poor homes (especially in service-poor informal areas) may be important factors contributing to food choices. Both the link between media/advertising and food choices and between conditions of the built environment and food choices require further research.

The design and structure of cities is an important influence on health outcomes. For example, supermarket location has direct implications for the food and nutrition choices that people make. A recent review of the literature found that the dietary implications of supermarkets "are

both positive – supermarkets can make a more diverse diet available and accessible to more people – and negative – supermarkets can reduce the ability of marginalised populations to purchase a high-quality diet, and encourage the consumption of energy-dense, nutrient-poor highly-processed foods. Overall, the most universally applicable dietary implication is that supermarkets encourage consumers to eat more, whatever the food."[89] In the Southern African context where the poor comprise a growing majority of the urban population in the midst of the nutrition transition, more research on the impact of supermarket expansion on urban diets is urgently required.

Other factors influencing health in urban settings include sedentary lifestyles, environmental pollution, stress and crowding, and the associated mental health challenges associated with urban poverty. Research on rural-urban migrants in other contexts clearly demonstrates that health is inversely correlated with length of time in an urban area. A recent study of rural-urban migrants in China found that increases in mobility were associated with suboptimal health status, inferior health-seeking behaviour, elevated levels of substance use, depressive symptoms and expression of dissatisfaction with life.[90] In South Africa, studies have observed that rural-urban migrants become increasingly unhealthy with time in the city, and that these changes are attributable to four common lifestyle changes: a decrease in physical activity, a change in diet and eating patterns, adoption of tobacco use and increased alcohol use.[91] The Transition and Health during Urbanisation of South Africa (THUSA) study found that physical inactivity is a major determinant of obesity in adult black women in the study area (North West Province).[92] Subjects in the highest tercile of physical activity were less likely to be obese, and inactivity was the strongest predictor of obesity, when compared to other demographic and self-reported dietary factors. In addition, "associated cardiovascular risk factors were significantly attenuated in those women who were physically active, even at the same level of obesity."[93]

4. Nutrition and Food Safety

The 1996 Rome Declaration on Food Security asserts the right of everyone to "safe and nutritious food."[94] According to the FAO, street foods "represent a significant part of urban food consumption for millions of low-and-middle-income consumers, in urban areas on a daily basis."[95] They are often the cheapest and most accessible means of obtaining a meal outside the home for many low income people. The AFSUN baseline survey showed that poor urban households in Southern African cities rely

heavily on informally marketed, prepared and sold food for their daily requirements.[96] While supermarkets are growing in importance as a source of food, informal food suppliers are the most commonly patronised (used by 70% of households in the study). Nearly a third of the households source food on a daily basis from informal markets and street vendors. The importance of the informal food economy varies from city to city. In some, such as Maputo, Blantyre, Harare and Lusaka, over 90% of poor urban households source food from informal suppliers. Informality is also important in South African cities where supermarket penetration is greatest: 66% of households in Cape Town and 85% in Johannesburg sourced food from informal suppliers. The informal economy is also important in Windhoek (76%) but rather less so in Manzini (49%) and Maseru (48%). The only city where less than a third of households patronise informal suppliers is Gaborone (at 29%). The organization of informal supply chains have been discussed elsewhere by AFSUN.[97] The relevant issue here is the nutritional value and safety of street foods on which so many of the urban poor depend.

On many of the streets of Southern African cities, informal vendors (primarily women and children) run small stalls selling fruit and vegetables which they acquire from a variety of sources including supermarkets, wholesalers and direct from producers. Increasingly, too, vendors sell processed junk food snacks along with their more healthy fruit and vegetable options. Outside schools in some of the poorer barrios of Maputo, junk food is the only option for school children on break. Vendors divide up large packets of chips, sweets and other snacks into smaller portions and sell these to children wrapped in plastic. Fresh fruit is rarely seen at stalls outside these schools. In many cities, vendors prepare a variety of hot "street foods" at their stalls or on sidewalks which are sold to passing consumers at meal times and are generally much cheaper than the fast-food equivalent. Many vendors also prepare "indigenous" foods.

In some cities, municipal hostility towards street food vendors forces them to be extremely mobile or to use designated market spaces for which they are generally charged. Many communities in Maputo and elsewhere have dedicated spaces for informal markets where women and children sell fresh and processed produce. In the markets in Maputo, women also sell fresh and dried fish and uncooked chicken. Most of the chicken is not local, or even South African, but comes from Brazil. In some urban areas, larger, centralised markets draw consumers from throughout the city. The tightly-regulated Yeoville Market in Johannesburg, for example, caters largely to a non-South African customer base in the inner city, providing imported fresh, processed and cooked foods to migrants from the rest of the continent.

In dietary terms, little is known about the nutritional value and contribution of the fresh and processed foodstuffs and ready-to-eat foods and beverages prepared and/or sold by vendors or hawkers on the streets of the region's urban areas. One study in Nairobi investigating the nutritional contribution of street foods found that non-home prepared foods contributed 13-36% of dietary energy; 11-20% of Vitamin A intake and 7-20% of iron intake of urban residents.[98] A study of consumption of street foods by school children in Tanzania found that nearly 97% of the children purchased food from street food vendors (68% every day).[99] On average, 47% of the children in rural schools purchase street foods every day compared to more than 80% in schools located in Dar es Salaam. The types of street foods sold contain mostly energy and fat, and very little micronutrients. Improving the nutritional quality of street foods could help to meet the micronutrient needs of school children.

Another nutrition-related issue which has attracted some attention is whether the cheaper food from the informal economy is actually safe and nutritional or whether it compromises the health of consumers. This issue came to the fore in Africa in the 1990s after a WHO survey of street foods in over 100 countries found widespread contamination (from raw food, infected handlers and inadequately cleaned equipment). Time and temperature abuse were the major factors contributing to food-borne disease.[100] Concerns about the safety and hygiene of informal (particularly prepared) food have dominated discussion ever since:

> The risk of serious food poisoning outbreaks linked to street foods remains a threat in many parts of the world, with microbiological contamination being one of the most significant problems. Food-borne pathogens are recognized as a major health hazard associated with street foods, the risk being dependent primarily on the type of food, and the method of preparation and conservation. A lack of knowledge among street food vendors about the causes of food-borne disease is a major risk factor. Poor hygiene, inadequate access to potable water supply and garbage disposal, and unsanitary environmental conditions (such as proximity to sewers and garbage dumps) further exacerbate the public health risks associated with street foods. Improper use of additives (often unauthorised colouring agents), mycotoxins, heavy metals and other contaminants (such as pesticide residues) are additional hazards in street foods.[101]

The potential health hazards of street foods have been assessed in Southern African cities such as Harare and Gaborone and generally concur with the WHO findings.[102] There is no reason to think that similar potential health hazards do not exist in other cities in the region. However, it would be

incorrect to infer that supermarket foods are necessarily uncontaminated. In Gaborone, for example, while there is a higher prevalence of Listeria monocytogenes in ready-to-eat foods in the poorer areas of the city, there was no significant difference between products from the supermarket and the street.[103] A similar finding was obtained in an analysis of uncooked chicken from various outlets in Gauteng, South Africa where 61% of the carcasses were contaminated with pathogens (*Listeria monocytogenes*, *Salmonella* or *Campylobacter*). Again, there was no significant difference in pathogen levels between products from supermarkets and street-vendors.[104] As Morobe concludes, the presence of human pathogens in ready-to-eat foods [from both supermarkets and street-vendors] should be considered as having significant public health implications, particularly among HIV and AIDS patients who are at greater risk.[105]

However, street foods are not necessarily unhealthy and to be avoided. Microbiological studies of the safety of ready-to-eat street foods in South Africa analysed aerobic bacterial counts, coliform counts and the presence of food-borne bacterial pathogens in food sold in central Johannesburg.[106] The studies concluded that the production of relatively safe street-vended foods, with low bacterial counts, was certainly possible even under conditions of improper hygiene and a lack of basic sanitary facilities. Another study of street food in Gauteng found that most food samples had relatively low microbiological counts and low incidence of pathogens.[107] Vendors also maintained a high standard of hygiene during preparation and serving of foods. Similar results were reported from a study in Bloemfontein.[108] Nevertheless, the FAO's Technical Cooperation Programme (TCP) project on Improving Street Foods in South Africa (2002) suggested that there was still room for improvement, particularly in the training of vendors in principles of hygiene and safe food handling. In order to devise appropriate public health responses, a broader study of the importance of street foods in the diets of the urban poor and their contribution to safe, nutritionally-balanced food intake would be extremely useful.

5. CONCLUSION

Food insecurity in Africa has risen to the top of the international development agenda over the course of the last decade. Most of the policy and research emphasis, however, is on the chronic problem of undernutrition and associated negative health outcomes in the rural areas of the continent.[109] Important as it is to find ways to overcome rural poverty and malnutrition, Africa faces an increasingly urban future and urbanization

per se is not the panacea for food insecurity. Indeed, undernutrition itself is taking on an increasingly urban character in Africa. There is therefore an urgent need to document the levels and determinants of nutritional status in the region's rapidly-expanding urban areas. As Monteiro *et al* have argued in relation to Brazil, "recognizing that the links from food availability to access to consumption to nutritional status are not automatic, the challenge for policy makers and analysts concerned with achieving food and nutrition security is to understand how these variables are linked to one another, how closely they are related in various contexts and what the important intervening variables are which affect the linkages among these variables."[110] Understanding these variables and linkages is particularly challenging in Southern Africa given the range of issues affecting nutritional outcomes. Although there is a growing recognition that the food security and nutritional status of poor people in urban areas are matters of concern in Southern Africa, relatively little information is available to guide sound policy making.

Food policy is generally seen as something to be formulated and implemented not researched. However, given the scope and complexity of the problems of urban nutrition, it is important to research and evaluate the successes and failures of past programmes.[111] This applies both to the nutrition policies of national and local governments and the programmes of international organizations such as the FAO, UNICEF and WHO. When apparently forward-looking policies such as the South African Integrated Food Security Strategy are not implemented, it is important to know why.[112] Even the best-looking government policies have the potential to founder on the rocks of inadequate resourcing, lack of political ownership and intra-departmental competition.

In this paper, we have attempted to put the nutritional dimensions of urban food insecurity more firmly on the urban food security research and policy agenda. In the urban context food accessibility and dietary quality are the critical determinants of household and individual nutritional status. AFSUN's 2008-9 baseline food security survey in eleven different cities showed that three quarters of households were food insecure.[113] However, as reported above, less than ten percent of households reported that they often experienced an absolute shortage of food or often went hungry. Rather, they more often ate smaller meals or ate fewer meals a day in response to a lack of resources to purchase food. However, many more households said they often did not eat their preferred diet, ate food that they did not like and ate a diet that lacked diversity. In general, dietary diversity scores are very low. In other words, undernutrition in the urban context may be as much about what people can afford to eat as how much they can eat.

The AFSUN survey also suggests that there is considerable variation from city to city across the region, a phenomenon which requires closer examination and more explanation. In South Africa, surveys such as the National Demographic Health Survey, National Consumption Survey and National Income Dynamics Surveys provide baseline information on the physiological outcomes of nutritional deficiencies (using standard measures of underweight and overweight and stunting and wasting amongst children) and relationships with various economic, demographic, gender and geographical (e.g. urban *v* rural) variables. Similar information is lacking in most other SADC countries. Case study data from particular communities is invaluable in demonstrating that all is not well but it is hard to generalise from these studies.

Research in the rural context focuses primarily on the causes and consequences of undernutrition (often incorrectly assumed to be the result of an absolute shortage of food rather than a dearth of resources to access that food). As we have argued here, undernutrition is also a significant and growing problem in Africa's rapidly growing towns and cities. However, urbanization is bringing with it a nutrition transition and the growth of another significant nutritional problem: overnutrition or obesity. The evidence reviewed in this paper suggests that levels of obesity are escalating rapidly in the continent's towns and cities and not just amongst the more affluent and better-off. Poor urban communities and households of Southern Africa are being increasingly affected by a double burden of undernutrition and overnutrition. Regional research on the causes and consequences of urban overnutrition is (with the exception of South Africa) very much in its infancy.

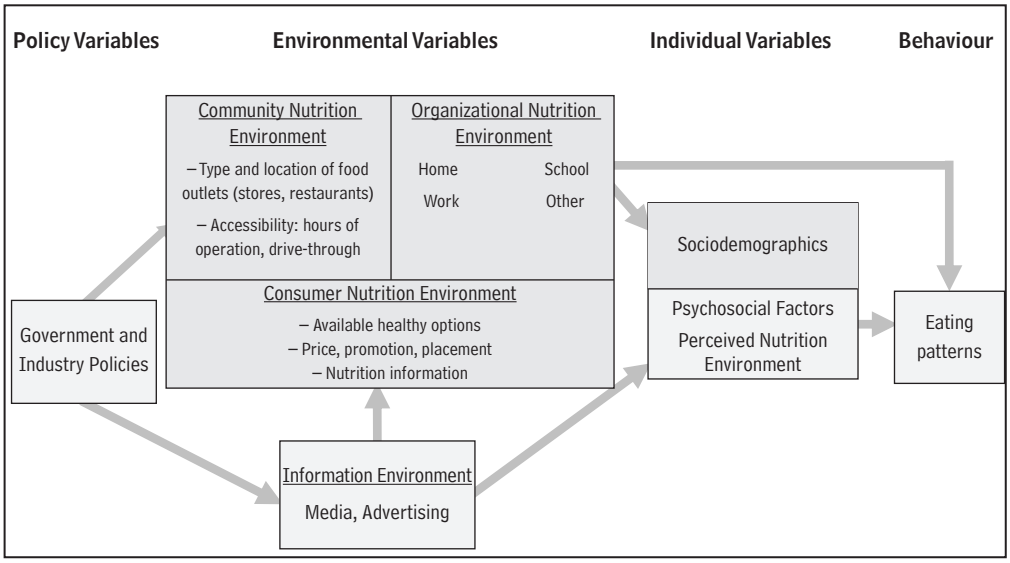
The lack of attention to obesity in Southern Africa as a whole is likely to be rectified in time but it is important that such research is driven by an appropriate conceptual framework that moves beyond the documentation of individual and household consumption patterns and behaviours. As Glanz et al have recently observed:

> The widespread prevalence of obesity is poorly explained by individual-level psychological and social correlates of diet and physical activity behaviors. Moreover, advice to simply ''eat less and move more'' ignores the complex influences of the social and built environments on individuals' access to affordable, healthful food and activity-friendly communities.[114]

Their suggestion is to focus research and policy attention on various ''nutrition environments'' (see Figure 3), defined as the social, policy, and spatial environments that influence access to food and what kinds of food people can access.[115] The model proposes four types of linked nutrition

environment: (a) community (type, location and accessibility of food outlets); (b) organizational (the physical and institutional spaces where food is consumed); (c) consumer (the availability and price of and nutrition information about food in food outlets); and (d) information (media and advertising). These inter-linked nutrition environments impact on eating patterns as mediated by various individual demographic, psychosocial or perceptual factors. Attempts to better understand the operation and interaction of nutrition environments have led to the (ongoing) development of the Nutrition Environment Measurement Study (or NEMS). Operationalising a NEMS methodology has proven to be a challenge with most of the focus to date on cataloguing varying consumer and community nutrition environments.[116] The "nutrition environments" model has not yet attracted much attention in developing countries. Nevertheless, suitably modified, it could be a useful starting point for thinking about priorities in designing a future programme of research on the complex character of the nutrition transition in contemporary African cities.

FIGURE 3: Model of Nutrition Environments



Source: Glanz et al, "Healthy Nutrition Environments."

In this review of the state of knowledge on urban nutrition we have highlighted several other emerging issues that need to be considered in a policy-oriented research programme on nutrition in African cities:

- To date, most of the research on the connections between food insecurity and poor nutrition has focused on physiological outcomes. While impaired brain development in infancy and childhood is one of those outcomes, much less attention has been paid to the psychological dimensions and outcomes of acute or chronic food insecurity on the

mental health of adults. There is therefore an urgent need to supplement the focus on nutrition and physical health with a complementary exploration of the relationship between food insecurity, nutrition and mental health.

- The state of knowledge about the 'vicious' cycle of nutrition and communicable disease such as HIV and TB is particularly relevant in the Southern African context. As the epicentre of the global HIV pandemic, the issue of how poor nutrition hastens the advance of AIDS and how HIV and AIDS impact on the nutritional requirements of PLHIV are important questions. This literature on HIV and urban nutrition has been reviewed in a previous AFSUN publication.[117] However, it is important to re-emphasize the point made there that while there is a considerable body of biomedical research on nutrition and HIV, our understanding of the broader linkages between HIV and urban food security is much less refined.
- Social protection is being widely advocated by international organizations as a way to stave off rural hunger and undernutrition. There is some evidence that the households that receive social grants have lower prevalence rates of hunger for young children as well as older children and adults, even compared to those households with comparable income levels.[118] There is also some evidence that the CSG has a positive and significant impact on child height-for-age and on women's health and nutritional status once they reach the age of 60.[119] The impact of social grants on the nutritional status of individuals and households requires much further investigation, however.
- Much of the existing research on the health consequences of food insecurity focuses on nutrition-related disease. However, the question of food-borne disease is of particular relevance in Africa. A recent UNICEF/WHO report notes that undernutrition makes children particularly susceptible to the diarrhoea that kills over one million in Africa every year.[120] One way in which pathogens are spread is via contaminated food. As the FAO/WHO have noted, "persons suffering from diseases such as HIV/AIDS, tuberculosis, malaria, and other various ailments affecting the region are at a greater risk to be debilitated by unsafe food, as their immune systems are already compromised. Thus, the assurance of safe food is essential to improving the quality of life for those already affected by disease. Equally, persons suffering from food-borne illness are more likely to contract other communicable diseases."[121] Much more research is necessary on the issue of food-borne disease, right across the food supply and distribution chain not just (as has been the case hitherto) among street food vendors.[122]

Urban food security is currently largely ignored by the international and national policy community in favour of an almost exclusive focus on the food insecurity of rural populations. The only significant exception is in the area of nutrition. The nutritional status of the urban poor continues to attract considerable attention, particularly in the biomedical and public health fields.[123] While this is a reasonable starting point for a conversation, food security is not only about nutrition, food fortification and feeding programmes. We need to go much further in thinking through the complete range of possible determinants and remedies for food insecurity under conditions of rapid urbanization. In policy terms, there are an increasing number of programming statements about public health, nutritional, biomedical and epidemiological policy interventions to improve the nutritional and health status of food insecure individuals and households.[124] As important as these proposals are, however, their effectiveness is likely to be undermined without a broader definition and understanding of the highly complex challenges of food insecurity and the structural basis of poverty, inequality and food inaccessibility in the rapidly growing urban centres of the sub-continent.[125]

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Rapid Urbanization and the Nutrition Transition in Southern Africa

The nutrition transition, including the presence of malnutrition and obesity in poor urban populations (the so-called 'double burden' of disease), is occurring in Southern Africa in the context of massive rural-urban migration and rapid urbanization. This seemingly contradictory situation poses one of the major threats to public health in the developing world, and impacts the poor – and therefore the most food insecure – to the greatest extent. This paper reviews the state of knowledge about food insecurity and the nutrition transition in the urban areas of Southern Africa drawing on existing studies and new research conducted by AFSUN. The paper lays out an agenda for future research on nutrition environments and discusses the implications of undernutrition and overnutrition for urban policy making on health and food security in the region.

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