

WILD FOODS, THE
NUTRITION TRANSITION
AND URBAN FOOD
SECURITY IN NORTHERN
NAMIBIA

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Abstract

Rapid urbanization and food system transformation in Africa have been accompanied by growing food insecurity, reduced dietary diversity and an epidemic of non-communicable disease. While the contribution of wild and indigenous foods (WIF) to the quality of rural household diets has been of longstanding attention, research on their consumption and role amongst urban households is much more recent. This paper focuses on the consumption of WIF in three towns in northern Namibia with close ties to the surrounding rural agricultural areas. Based on data from a household survey of food sourcing and consumption patterns in 2018, the paper shows that most households do consume wild foods acquired through informal market channels or sent by rural family members. These WIF food remittances play different roles in the food security of different types of households. Poorer, food insecure households tend to consume WIF more frequently and that while these foods play a role in diversifying diets, they are insufficient to lift these households out of chronic food insecurity. Higher-income households consume wild foods less frequently and more for reasons of cultural preference and taste than necessity. The paper raises several issues for future research including the reasons for continued urban household consumption of WIF, the nature of the supply chains that bring WIF to urban consumers and the impact of climate change on the future supply of WIF to urban areas.

Keywords

food security, urbanization, indigenous foods, nutrition transition

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Introduction

Across the African continent, hyper-urbanization is transforming urban food systems, creating obesogenic food environments and driving a marked deterioration in the quality of urban diets (Bosu 2015, Crush and Battersby 2016, Frayne, Crush and McLachlan 2014, Kroll et al 2019, Steyn and Mchiza 2014). This accelerating ‘nutrition transition’ is characterized by reduced dietary diversity; lower intake of complex carbohydrates, dietary fibres, fruits and vegetables; increased intake of energy-rich cereals, fats and sugars; and mass consumption of highly-processed foodstuffs (Gassara and Chen 2021, Holdsworth and Landais 2019, Holmes et al 2018, Reardon et al 2021). The lack of access to and intake of healthy foods is driving a silent epidemic of non-communicable disease (NCDs) such as obesity, diabetes, and cardiovascular disease (GBD 2017, Popkin 2015, Popkin, Adair and Ng 2012, Ronto, Wu and Singh 2018). There has been a major increase in disability-adjusted life-years (DALYs) due to non-communicable disease in Sub-Saharan Africa over the last three decades, from 90.6 million in 1990 to 151.3 million in 2017 (Gouda et al 2019). They further project that by 2030, NCDs associated with the nutrition transition will become the leading cause of mortality on the continent. In Namibia, the IHME (2016) notes that non-communicable disease as causes of premature mortality, disability, and total health loss (DALYs) rose significantly in importance over the period 2000 to 2013.

In this context, the changing nature and composition of household diets is of particular importance (Kazembe, Nickanor and Crush 2022a, Nickanor and Kazembe 2016). Wild and indigenous foods (WIF) have long been a key component of household diets in rural Africa (Bharcucha and Pretty 2010, Sardeshpande and Shackleton 2020a, 2020b, Zinyama, Matiza and Campbell 1990). However, as Hunter and Fanzo (2013) note, “terms such as underutilized, neglected, orphan, minor, promising, niche, local and traditional are frequently used interchangeably to describe these potentially useful plant and animal species, which are not

mainstream, but which have a significant local importance.” Consistent with the conventional view that food insecurity in Africa is primarily a rural phenomenon (Crush and Riley 2019), research attention has turned to the potential of wild foods to enhance food security and dietary diversity in rural households (Fanzo, Hunter, Borelli and Mattei 2013, Hickey et al 2016, Kasima et al 2018, Kazungu et al 2020, Ngome et al 2017, 2019, Paumgarten, Locatelli and Witkowski 2018, Powell et al 2015, Rasmussen et al 2020, Shackleton and Shackleton 2004). In cities, many at a distance from sites of natural biodiversity, there is a perception that wild and traditional foods are not easily accessible and therefore do not represent a viable or even partial solution to mitigating food insecurity and improving dietary diversity.

The rural bias of food security-related research on wild and traditional foods has begun to be corrected by case studies of urban wild food consumption in several African cities. In Uganda and South Africa, for example, urban foraging for wild foods provides an important source of dietary supplement among low-income households (Garekae and Shackleton 2020a, Mollee et al 2017). Urban foraging ameliorates “the monotonous diets of some households and in turn promoting dietary diversity” (Garekae and Shackleton 2020a, see also Garekae and Shackleton 2020b, Garekae, Shackleton and Tsheboeng 2022, Kaoma and Shackleton 2014). The consumption of wild foods improves general household food security but does not mitigate food insecurity among low income urban households (Chakona and Shackleton 2019). In Kenya, Gido et al (2017) argue that the consumption of indigenous leafy vegetables is higher in rural than urban areas but that improved market supply chains would enhance urban availability and access.

While urban foraging is a global phenomenon, in most cities and towns the volume of wild foods available to foragers is likely to be fairly limited and not easily accessible to the population at large (McLain 2014, Shackleton et al 2017). Sneyd (2015, 2016), however, shows that in Cameroon a wide variety of forest foods are actually collected outside urban areas and transported and sold in urban markets by

informal traders. At the same time, while household food budgets include a significant spend on wild/traditional foods, they are being increasingly displaced by cheaper food imports including rice (Sneyd 2013). More research is thus needed on the market and non-market channels by which wild/traditional foods from rural areas arrive in cities and how accessible they are to consumers. Another key question raised by the case study literature is the relative importance of wild/traditional foods relative to other types of purchased food in urban diets including fruit and vegetables mass produced on commercial farms, imported and locally-grown starchy staples such as rice and maize, and highly processed foods rich in sugar, oils and fats. In fact, the literature is, largely silent on the significance and future of wild/traditional food in urban food systems increasingly dominated by formal food retail including supermarkets. Finally, while some case studies do attempt to situate the contribution of wild/traditional foods to improving dietary quality and food security, none claim that their consumption will avert the growing crisis of urban food insecurity, dietary deprivation and the negative health consequences of the nutrition transition.

Against the backdrop of the under-researched role of WIF consumption and food insecurity in African cities, this paper presents a case study from the rapidly urbanizing northern region of Namibia. To date, studies of wild and indigenous foods in Namibia have followed the conventional path, focusing on collection and consumption in rural areas of the country. Ethnobotanical knowledge of the types, range and edibility of wild fruits is extensive amongst rural residents of northern Namibia. There are at least 25 different species of fruit trees with indigenous names used for food and/or medicinal purposes, as well as a variety of edible leafy vegetables, insects (such as mopane worm) and frog (Chataika et al 2020, Cheikhoussef and Embashu 2013, Kamwi, Endjala and Siyambongo 2020, Maroyi and Cheikhoussef 2017, Mushabati, Kahakam and Cheikhoussef 2015, Nantanga and Amakali 2020, Okeyo, Kandjengo and Kashea 2015, Thomas 2013). The collection of wild fruits tends to be higher among households with limited

cash income and greater food insecurity suggesting that own consumption may primarily be a survival mechanism (Musaba and Sheehama 2009).

The case study literature on rural Namibia does suggest that there are ongoing shifts in the role of wild and indigenous foods in northern Namibia which could impact on urban consumers and food environments. First, detailed knowledge about wild foods tends to reside with older members of the community who traditionally pass this information on to their younger relatives. However, as rural diets begin to rely more on food purchase and food preferences change, younger people seem less interested in acquiring this knowledge. They prefer the convenience of not having to forage wild foods, and eating imported alternatives when available (for example, store bought spinach and broccoli over wild leafy greens) (Maroyi and Cheikhoussef 2017, Mushabati, Kahaka and Cheikhoussef 2015). Second, the destruction of natural habitat through overgrazing and woodland destruction for fuel is being exacerbated by climate change (Haindongo, Kalumba and Orimoloye 2022, Kamwi et al 2015, 2018, Kamwi and Mbidzo 2022, Mulwa and Visser 2020, Wingate, Phin and Kuhn 2016). Although the evidence is sketchy, this is having a negative impact on the availability of wild foods. As one livestock farmer in the Kunene region of Namibia observed: “a long time ago, people survived on these; wild fruits and wildlife. Now there is nothing. We rarely get fruits from the wild, and all the wild animals are no longer here” (cited in Inman, Hobbs and Tsvuura 2020).

Rural food insecurity and declining agricultural productivity mean that households are increasingly reliant on cash income for food and other basic needs purchase. This, in turn, has exacerbated rural to urban migration as working-age household members move to cities in search of employment and other income generating activity. Household members in the city remit income to their rural families and the latter regularly send agricultural produce to their relatives in the city. This phenomenon – of rural to urban food transfers or remittances – has been extensively documented in Namibia since it was first observed by researchers

in the early 2000s (Frayne 2004, 2005, 2007, Frayne and Crush 2018). Apart from pearl millet (mahungu), wild foods are the most important type of foodstuff transferred. One survey of low-income households in the capital, Windhoek, for example, found that 62% of households received food transfers from the rural areas and that of these 50% received wild foods (Frayne 2010). In addition to these informal channels of rural-urban wild food transfer, many rural households have turned wild foods into income-generating commodities. Informal supply chains have therefore sprung up delivering wild foods to urban markets where they are sold in formal and informal markets and by street vendors.

This paper contributes to the literature on food security and WIF consumption in African cities by examining the extent, frequency and consumption of consumption by urban households in urbanizing northern Namibia. The next section of the paper charts the process of secondary urbanization in the region, the associated transformation of the food system and the types of WIF consumed by households in the corridor. and the determinants of reliance on wild foods. Section 3 describes the data source for this paper and research methodology of a representative household food security survey conducted in 2018 in the OOO corridor. Section 4 provides a descriptive statistical analysis of the frequency of WIF consumption and identifies the types of households most likely to be frequent consumers. The section also models WIF consumption as a whole and the likelihood of different types of household consuming WIF. Section 5 discusses the significance of the results and the Conclusion to the paper identifies areas for future research that builds on these findings.

Methodology

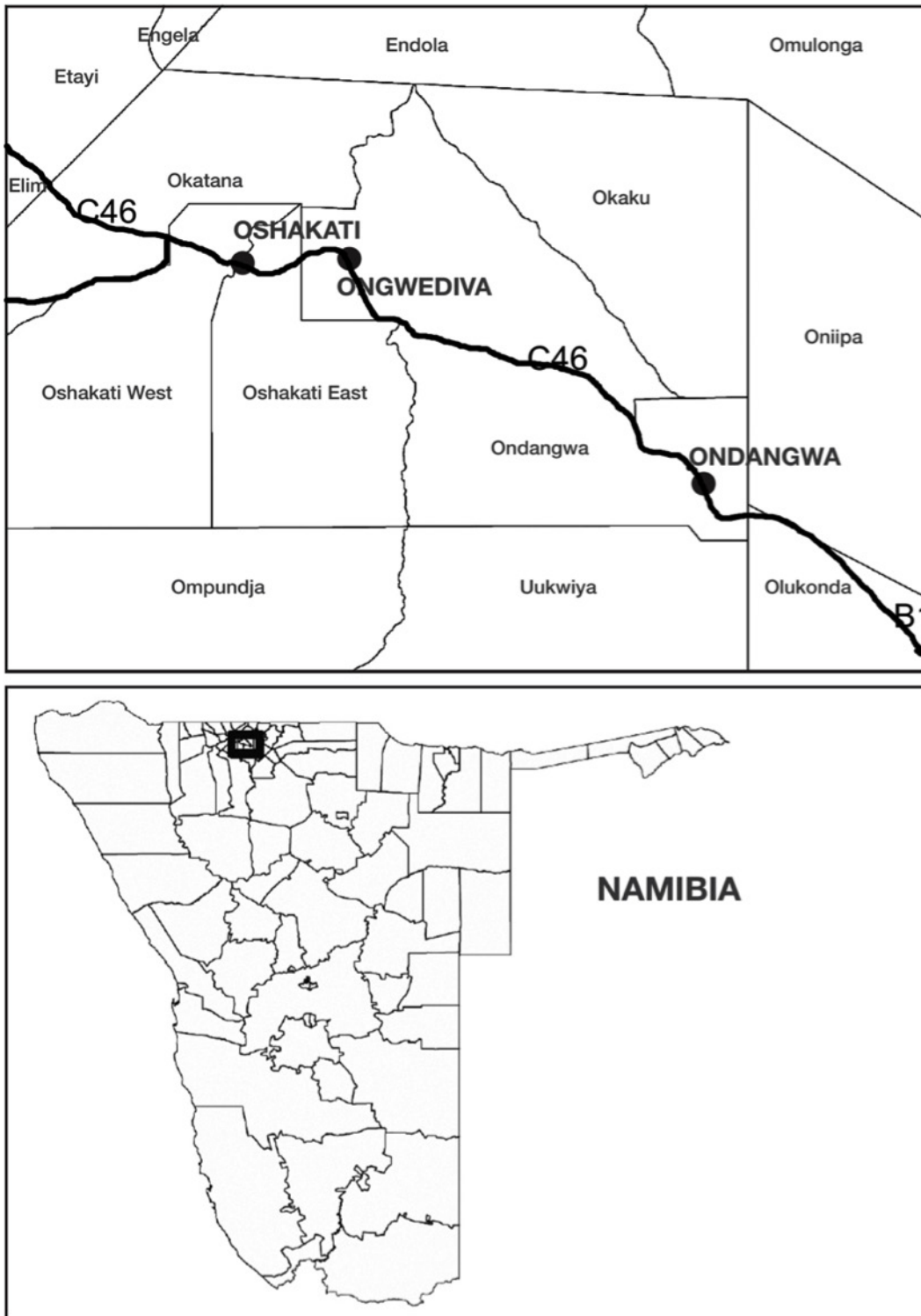
The Oshakati, Ondangwa, Ongwediva (OOO) urban corridor in northern Namibia links the three secondary cities together along a 30 km stretch of highway in the Oshana region (Figure 1). The urban corridor is approximately 5kms wide

on both sides of the highway which is the major route for trans-border trade between Namibia and Angola (Nangulah and Nickanor 2005). Oshakati and Ongwediva are effectively a single urban centre with boundaries that have blurred over time, while Ondangwa is separated from the other two by about 28 kms. The combined population of the urban corridor was projected to be nearly 110,000 in 2021 with a growth rate of 5-8% per annum (NSA 2014). High levels of food insecurity and urban poverty are well-documented (Nickanor et al 2019).

The food system in the urban corridor is a complex and dynamic mix of the formal and the informal, the long-distance and the local (Kazembe, Crush and Nickanor 2022b, Nickanor, Kazembe and Crush 2022). The formal system is increasingly dominated by local and international supermarket chains based in Windhoek, South Africa and Botswana (Nickanor et al 2017). Most of the fresh and processed food on supermarket shelves is imported into the corridor through long-distance supply chains originating on private commercial farms and ranches in Namibia, abattoirs and milling plants in Windhoek, supermarket distribution centres in South Africa, and food imports direct from Europe and, in the case of rice, Thailand. The informal food sector consists of small-scale food retailers operating in formal and informal marketplaces, mobile vendors selling house-to house, and tuck shops (tin structures in informal settlements).

Wild foods enter the urban corridor in three main ways: (a) sent by rural households to family members resident in the corridor; (b) urban household members foraging or catching wild foods in rural areas; and (c) collected and transported by informal vendors. Some vendors collect wild foods themselves in rural areas, while others purchase them from rural households and sell them on to consumers in formal and informal markets. The most common wild and indigenous foods northern Namibia are of three main types: (a) plants such as spinach and baobab and palm fruits; (b) insects such as flying ants and mopane worms; and (c) wildlife such as fish, frogs and squirrel (Table 1).

FIGURE 1: Location of the OOO Urban Corridor



Source: Namibia Statistics Agency

TABLE 1: Common Wild and Indigenous Foods in Northern Namibia

Oshiwambo name	English translation
Eembe	Bird plum
Eendunga	Palm/makalani fruits
Eeshi	Fish
Eenyandi	Jackal berries
Evana/Ekaka/Ombonga	Dried and fresh spinach
Okadhila	Birds
Okalimba	Rabbit
Omafuma	Frogs
Omagungu	Mopane worms
Omakwa	Baobab fruit
Omidhika	Cassava
Oontangu	Kapenta
Oothakulatha	Flying ants
Otushi	Mopane tar
Owawa/Omatumbuka	Mushroom
Uunyenti	Squirrel

The data for this study was derived from a representative household survey conducted in 2018 in the OOO corridor. The survey sample was based on a two-stage cluster sampling design. At the first stage, 35 enumeration areas (primary sampling units or PSUs) were randomly selected with probability proportional to population size. The PSUs were drawn from the master sampling frame established for the 2011 Population Census. The target PSUs included 18 in Oshakati, 7 in Ongwediva, and 10 in Ondangwa. At the second stage, a fixed number of 26 households were systematically selected in each PSU, giving a total sample size for each town of 468 in Oshakati, 182 in Ongwediva and 260 in Ondangwa. A questionnaire collecting detailed information on household structure, food consumption patterns and food sourcing behaviour was programmed into tablets using ODK software and administered face-to-face by the household head or representative.

The household level response variable in the analysis is frequency of consumption of the 16 different wild and indigenous foods divided into four categories: daily (at least five days per week), weekly (at least once per week), bi-weekly (at least twice per

month), and monthly (at least once per month). A number of variables were derived to explain the frequent consumption of wild and indigenous foods (defined as once per week or more frequently):

- Housing type is a binary variable where 1= formal housing and 2 = informal housing.
- Household structure is divided into five types: 1= female-centred (no husband or male partner), 2 = male-centred (no wife or female partner), 3 = nuclear (husband/male partner and wife/female partner with or without children), 4 = extended (husband/male partner and wife/female partner with children, relatives and non-relatives), 5 = single person household (respondent lives alone).
- Lived poverty is a continuous variable between 0 and 4 constructed as a measure of material deprivation based on the frequency of going without five basic necessities: water, food, cash income, medical care and cooking fuel (Dulani, Mattes and Logan 2013).
- Income poverty is a categorical variable on the official poverty line which defines a household as poor if it spent less than NAD520.80 per month on basic necessities, the equivalent of USD1.90 per day (Namibia Statistics Agency, 2016)
- Food security is measured using the Household Food Insecurity Access Prevalence (HFIAP) indicator and the Household Dietary Diversity Score (HDDS). The HFIAP categorizes households into one of four categories based on responses to frequency of occurrence answers to nine food deprivation questions. For this analysis the HFIAP is binned into two categories: food secure and food insecure. The HDDS allocates a score between 1 and 12 to each household based on how many food groups were consumed by household members in the previous 24 hours. For this analysis, the HDDS scores are binned into two categories: more diverse (6-12) and less diverse (0-5).

Frequency of Wild Food Consumption

Wild and indigenous foods are consumed by most households in the OOO corridor. A total of 817 out of 846 households (or 90%) had some wild food in their diet in the month prior to the survey. Table 2 shows the proportion of households that consumed each wild food at least once during the month. Spinach, bird plum and fish were consumed by

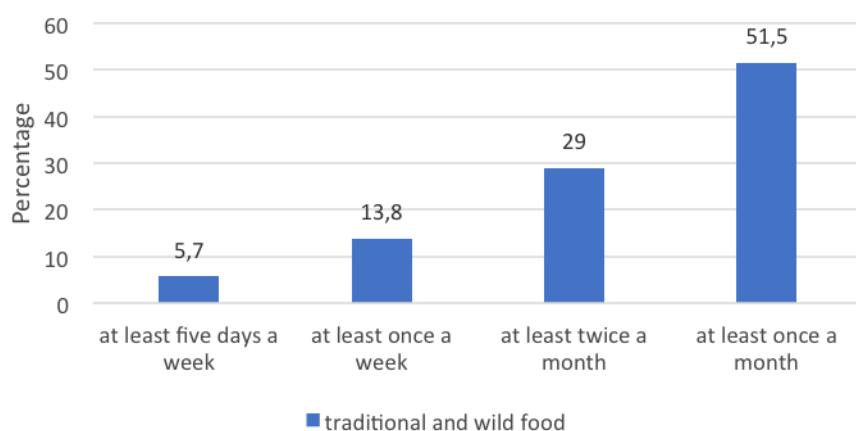
over 60% of households. Other popular wild foods included mopane worms (consumed by 35%), kapenta (26%), palm fruits (22%) and jackal berries (20%).

As a group, wild foods were consumed on a daily basis by only 6% of households (Figure 2). Another 14% incorporated wild foods into their diet at least once per week. The most frequent consumption category was once a month with just over half of households being occasional consumers.

TABLE 2: Consumption of Wild Foods in Previous Month

	No. of households	% of households
Evanda/Ekaka/Omboga – Dried/fresh spinach	574	68.2
Eembe – Bird plum	533	63.3
Eeshi – Fish	518	61.5
Omagungu – Mopane worms	296	34.7
Oontangu – Kapenta	215	25.5
Eendunga -- Palm/makalani fruits	184	21.9
Eenyandi – Jackal berries	166	19.7
Omafuma – Frogs	96	11.4
Owawa/Omatumbuka – Mushroom	61	7.2
Okadhila – Birds	36	4.3
Omakwa – Baobab fruit	31	3.7
Oothakulatha – Flying ants	17	2.1
Otushi – Mopane Tar	16	1.9
Okalimba – Rabbit	11	1.3
Omidhika – Cassava	9	1.1
Uunyenti – Squirrel	3	0.4

FIGURE 2: Frequency of Consumption of Wild Foods



The frequency of consumption varied by type of wild food (Figure 3). Daily and weekly consumption is dominated by *eeshi* (fish) (at 61% of consuming households). Other frequently consumed foods include *evanda/ekaka/omboga* (dried and fresh spinach) at 38%, and *eembe* (birdplum) at 31%. All the other wild foods are consumed frequently by less than 20% of households. Most other wild foods are consumed only once or twice a month by households.

Table 3 shows the association between the more frequent (at least weekly) consumption of wild foods and household characteristics. Several of these had a non-existent or weak relationship with more frequent consumption of WIF. For example, there was little association between housing type

and consumption frequency, with 19% of households living in informal housing and 20% in formal housing being frequent wild food consumers ($p=0.766$). However, this does not mean that there is no difference between formal and informal neighbourhoods as both kinds of housing structure can be found in informal settlements.

Type of household was also weakly associated with frequent consumption of wild foods: while only 14% of nuclear households had a high consumption frequency, there was very little difference between the other three types ($p=0.323$). The official marginal poverty classification appears to make no difference with households above and below the line (poor and non-poor) reporting similar consumption frequencies ($p=0.703$).

FIGURE 3: Frequency of Consumption of Different Wild Foods

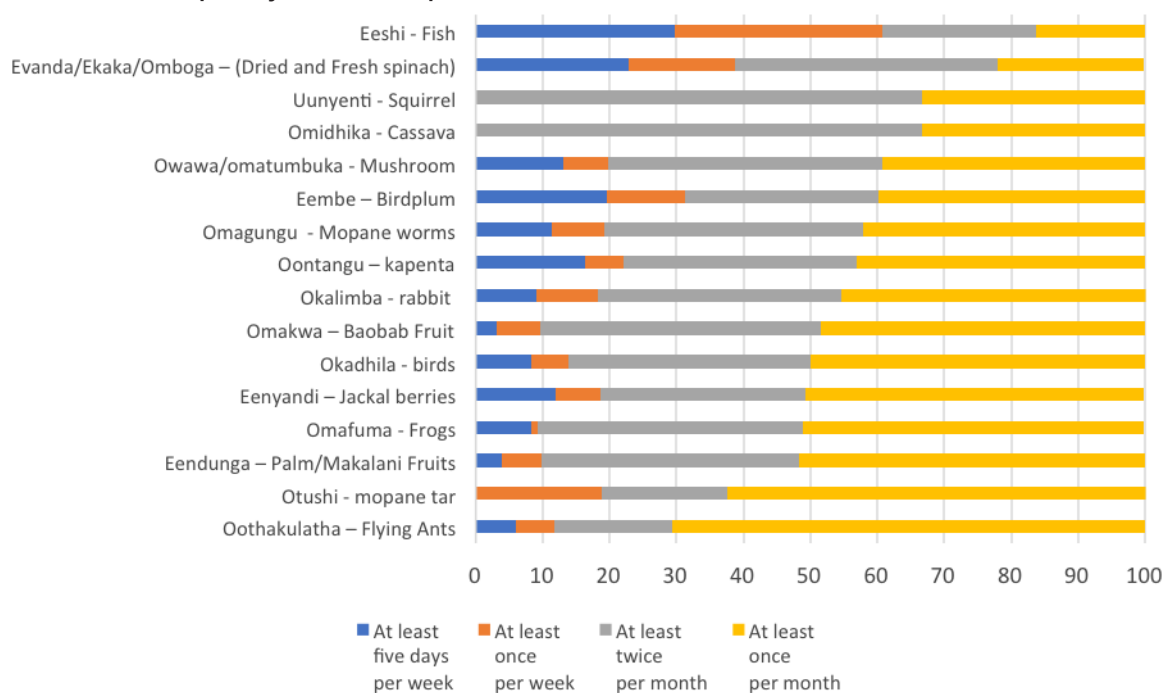


TABLE 3: Consumption of WIF and non-WIF by Household Variables

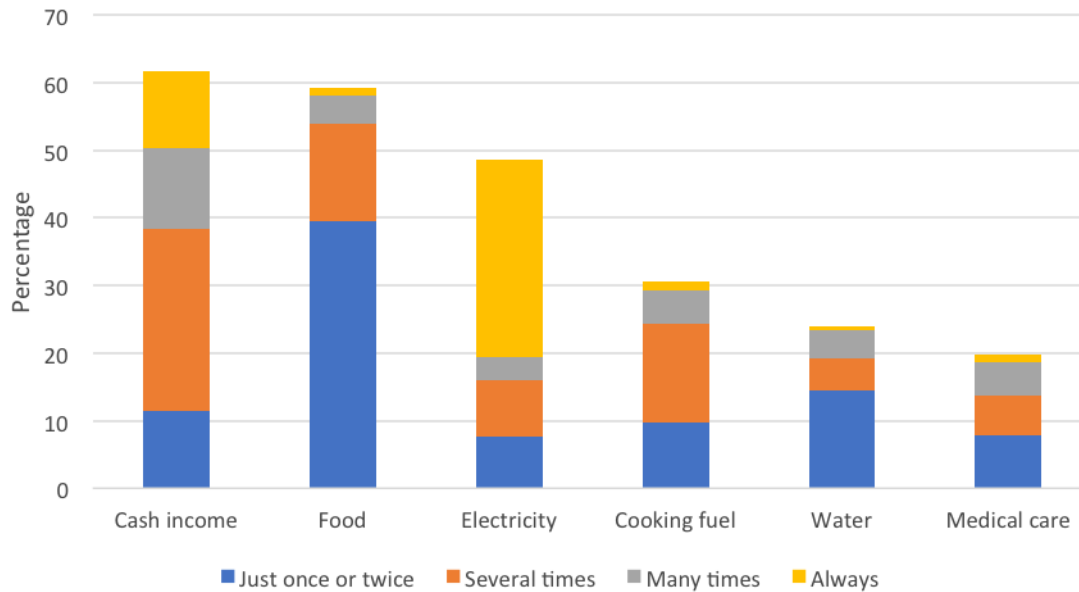
Variable	Categories	WIF			Chi-square (p-value)
		Weekly (%)	Others (%)	Total (n)	
Town	Oshakati	19.8	80.2	491	6.452 (p=0.040)
	Ongwediva	13.0	87.0	146	
	Ondangwa	23.8	76.2	214	
Household structure	Female centred	21.7	78.3	341	4.387 (p=0.323)
	Male centred	20.3	79.7	158	
	Nuclear	13.5	86.5	133	
	Extended	19.7	80.3	178	
	Single	23.5	76.5	34	
Informal housing	No	20.1	79.9	533	0.766 (p=0.419)
	Yes	19.2	80.8	312	
Income	<= NAD1,100.00	23.8	76.3	160	14.09 (p=0.005)
	1,101.00-2,100.00	27.7	72.3	119	
	2,101.00-4,250.00	21.6	78.4	134	
	4,251.00-12,000.00	15.4	84.6	149	
	1,2001.00+	11.2	88.8	125	
Marginal poverty	None	19.9	80.1	619	0.145 (p=0.703)
	Poor	21.9	78.1	64	
Lived Poverty Index	<=0.5	17.0	83.0	312	11.10 (p=0.011)
	0.51-1.00	19.6	80.4	112	
	1.01-1.50	28.9	71.6	102	
	1.51-4.00	12.1	87.9	140	
Food insecurity	Secure	19.6	80.4	265	0.981 (p=0.531)
	Insecure	19.7	80.3	584	
Household Dietary Diversity	Less diverse	23.8	76.2	543	16.33 (p<0.001)
	Highly diverse	12.1	87.9	290	

There is a stronger association between frequent consumption and spatial location with a low of 13% in Ongwediva to a high of 24% in Ondangwa (p=0.040). Household income had the strongest relationship with frequent wild food consumption (p=0.005). Frequent consumption was highest within the two lowest income quintiles (at 28% and 24% respectively) and lowest within the highest income quintile (at 11%). There was a similar association with lived poverty as the rate of frequent WIF consumption was higher in households with greater lived poverty (p=0.011). Figure 4 provides a breakdown of the five LPI basic needs for frequent wild food consumers in order to determine which needs are most closely associated with WIF consumption. Lack of cash income and food affect are the most important, experienced by 60% of

frequent food consumers. Lack of cash income and electricity is experienced most frequently by these households. The experience of food shortages and other basic needs tends to be less frequent.

In terms of the relationship between WIF consumption and the two food security measures (the HFIAP and HDDS), there appears to be little difference between households categorized as food secure and food insecure on the HFIAP (p=0.531). The relationship between WIF consumption and household dietary diversity is stronger but not in the expected direction of improved diversity (p<0.001); that is, only 13% of households with a more diverse diet are frequent consumers of WIF compared with 24% of households with less diverse diets. This suggests that wild food consumption is not frequent

FIGURE 4: Lived Poverty among Frequent WIF Consumers



or voluminous enough to positively influence the level of food security and dietary diversity of the two-thirds households that are food insecure.

To assess the differential effects of household factors on overall consumption of WIF, as opposed to frequency of consumption, an ordinal logistic regression model was fitted to the data (Table 4). This table assesses whether the odds of a household consuming wild foods in a one-month period vary from household to household. First, households in Ondangwa [OR:1.86 (95%CI =1.14-3.02)] and Oshakati [OR:1.36 (95%CI=1.01-2.03)] are more likely to consume WIF than those in Ongwediva. Second, households of all four main types (female-centred, male-centred, nuclear and extended) have very similar odds of consuming WIF. Third, households in formal housing were less likely to consume WIF than those in informal housing [OR:0.60(95%CI=0.40-0.83)]. Fourth, the odds

of consuming WIF were closely tied to household income. As household income decreased, so did the odds of consuming WIF. For example, households in the lowest income quintile were three times less likely to consume WIF than those in the upper income quintile [OR=0.31(95%CI=0.17-0.67)]. This contrast with the earlier finding that low-income households were more likely to be frequent consumers of WIF. Fifth, while marginal poverty had little effect on WIF consumption, households with low levels of lived poverty were more likely to consume wild foods than those with high levels of lived poverty [OR=1.55(95%CI=0.54-2.33)]. Finally, food secure households had slightly higher odds of consuming WIF than food insecure households [OR=1.11(95%CI=0.76-1.12)]. In contrast, to frequent WIF consumption, households with less diverse diets had lower odds of consuming WIF overall [OR=0.85(96%CI=0.59-1.23)].

TABLE 4: Odds of Frequent Wild Food Consumption

Variable	Categories	Traditional and wild foods			
		Odds ratio	95%	CI	p-value
Town	Oshakati	1.36	1.01	2.03	0.04
	Ondangwa	1.86	1.14	3.02	0.001
	Ongwediva (REF)	1.00			
Household structure	Female centred	0.52	0.23	1.58	0.128
	Male centred	0.65	0.27	1.40	0.341
	Nuclear	0.56	0.23	1.42	0.217
	Extended	0.59	0.24	1.50	0.235
	Single (REF)	1.00			
Informal housing	No	0.60	0.40	0.83	0.014
	Yes (REF)	1.00			
Income	<= NAD1,100.00	0.31	0.17	0.67	<0.001
	NAD1,101.00 – 2,100.00	0.38	0.22	0.97	0.001
	NAD2,101.00 – 4,250.00	0.57	0.33	1.13	0.038
	NAD4,251.00 – 12,000.00	0.69	0.42	1.60	0.141
	NAD12,001.00+ (REF)	1.00			
Marginal poverty	None	0.80	0.39	1.65	0.524
	Poor (REF)	1.00			
Lived Poverty Index	<=1.00	1.55	0.54	2.33	0.416
	1.01-2.00	0.83	0.30	2.61	0.721
	2.01-3.00	0.90	0.31	0.58	0.841
	3.01-4.00 (REF)	1.00			
Food insecurity	Secure	1.11	0.76	1.12	0.576
	Insecure (REF)	1.00			
Dietary diversity	Less diverse	0.85	0.59	1.23	0.395
	Highly diverse (REF)	1.00			

Wild Foods and Food Security

Supermarkets are the single most important source of household food in urban Namibia. In the OOO Corridor they are regularly patronized by 90% of households (Nickanor et al, 2019). However, the survey also found that 90% of households had consumed one or more wild foods in the month prior to the survey. The types of WIF consumed and the frequency-of-consumption vary considerably. Of the different wild foods, 60% had consumed spinach, fish and bird plum in the previous month, one third had consumed the insect, mopane worm, and a quarter had eaten kapenta and palm fruit. Only a few (less than 10%) had included foods such as mushrooms, birds, baobab fruit, flying ants, rabbit and squirrel in their diet. However, the overall consumption of wild foods tends to be infrequent and

occasional. For example, only 20% of households consume wild foods one or more times a week.

To better understand the role of wild foods in the diets of OOO households, this paper first focused on providing a picture of households that frequently consumed WIF. Only household income showed a strong association with lower-income households tending to be more frequent consumers than higher-income households. Other characteristics -- such as household type, lived and marginal poverty, housing type and household type -- showed a weak or non-existent association with frequent consumption. The same was true of food security with virtually the same proportion of both food secure and food insecure households being frequent consumers of WIF. The only marked difference related to dietary diversity: households with lower diversity were twice as likely to be frequent consumers of

WIF than those with high diversity. These findings suggest that frequent usage of wild foods does not have any marked impact on overall food security in the OOO corridor. On the other hand, frequent wild food consumption is important to households with limited dietary diversity.

The paper's second major focus was on what household characteristics made a household more or less likely to consume WIF over the course of a month. Here, using logistic regression and odds ratios, a somewhat different picture emerged of the relationship between household income, food security and general WIF consumption. As noted, the most frequent consumers of WIF are households with low incomes, high lived poverty and lower dietary diversity. When WIF consumption is modelled independent of frequency of consumption, a rather different scenario emerged. That is, households with higher incomes, higher dietary diversity and lower lived poverty had the highest odds of wild food consumption. To explain this seeming paradox, it is important to ask what makes poorer households with limited diets more frequent consumers of WIF, and what makes wealthier households with diverse diets only occasional consumers of WIF.

For poorer households, wild foods sent from the countryside or purchased from informal food vendors are a cheap and satisfying way of bringing some variety to an otherwise meagre and monotonous household diet dominated by cereals such as maize and mahangu (millet). For wealthier households with diverse diets, the occasional consumption of WIF is more of a choice than a necessity. For these households, WIF consumption has a value well beyond utilitarian usage in enhancing food security and dietary diversity. Rather, occasional incorporation of wild foods into the diet is more likely a familiar cultural dietary practice with deep historical roots that migrants have brought with them, one which reflects the importance of maintaining strong affective links with the rural home and with the natural environment.

Conclusion

Food system transformation, the growing role of supermarkets and long-distance supply chains, and the resilience of informal food vending of products from wholesalers all present urban consumers with a growing variety of food types and sources, provided they have the wherewithal to purchase those foods. In addition, there is growing evidence that urban diets in Namibia are becoming more westernized with an accompanying rapid increase in non-communicable disease (Crush, Nickanor and Kazembe 2021, Kazembe, Nickanor and Crush 2022a). The place of traditional rural foods, including wild and indigenous foods, in the context of urban and food system transformation is largely unknown and needs a great deal more research. This is therefore the first study to systematically address the relationship between rapid urbanization and wild and indigenous food consumption (WIF) in Namibia. Building on the literature on urban WIF consumption in other countries and rural WIF consumption in Namibia, this is the first study to examine the extent and frequency of WIF consumption in urban centres in the country by urban households that have strong ties to the rural areas.

Urbanization, food system transformation and changing consumer diets have not eliminated the appeal of wild and indigenous foods, however. The representative household survey found that the vast majority of households had consumed WIF in the month prior to the survey. However, there was considerable variation in which foods were consumed and in the frequency of consumption. The paper shows that the most frequent consumers of WIF were low-income households with limited dietary diversity. Although this practice did not appear to improve overall food security, it likely did mean that it improved their dietary diversity. For these households, then, WIF consumption was more of a necessity to improve the quality of the household diet. On the other hand, higher-income households with diverse diets were the most important occasional consumers of WIF. For these households improving the quality and diversity of their food intake was likely not the prime motivation for WIF

consumption. Rather, their consumption of wild foods was a matter of taste and of cultural continuity and connection with the rural areas.

This paper began by arguing that the relationship between rapid urbanization, urban food security and WIF consumption is a relatively neglected research area both in Namibia and more generally. There are at least three areas suggested by this analysis that need further exploration. First, to better understand the motivations of different types of urban household for continued regular or sporadic WIF consumption, further in-depth qualitative research is needed on accessing and consuming wild foods, and why certain foods are preferred. This would also shed light on intra-household wild food consumption. For example, are WIF preferred by older members of the household with stronger rural roots and what is the attitude of younger people given findings in the rural areas that they prefer westernized dietary alternatives promoted by supermarkets? A second area requiring more attention is to understand WIF supply chains from rural to urban areas. There appear to be three main ways in which WIF are available to urban households: through intra-family rural-urban transfers, foraging by urban household members, and informal supply chains and marketing. The precise balance and relative importance of these channels needs to be understood. Finally, in light of climate change and the increasing frequency of extreme weather events such as drought and floods in northern Namibia and more generally in rural Africa, it is important to assess whether the stock of WIF is in decline in the areas from which households draw these foodstuffs. A key research question is whether WIF consumption in urban areas is a passing phase or sufficiently entrenched and viable to continue to meet the food preferences of newly-urbanized households.

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