Carrying Beribu: "Three Canela women and one man carry a freshly-cooked manioc meat beribu pie. Beribu is usually made from certain varieties of sweet manioc. Photograph © Theresa Miller"
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With this double issue, Society, Biology and Human Affairs closes its cycle. Over several decades, the journal provided a space for young researchers mainly from the UK but lately, from other parts of the world, to showcase their work. A look at the content of published SBHA issues (in paper and online) attests to the varied and creative ways in which researchers addressed different aspects of the interaction between biology and society and discussed their impact on human affairs. The main purpose of The Biosocial Society for creating its in-house journal has thus, been dutifully met.

The Biosocial Society has evolved, re-focusing its energy and resources to promote biosocial research through a stronger award scheme to support under and postgraduate research and conference attendance, as well as, to fund small workshops aimed at keeping the dialog between biosocial disciplines going. The work continues.

In this issue, we find a combination of peer-reviewed research papers and research reports. These contributions come both from holders of bursaries awarded by The Biosocial Society and from others who were attracted to publish in the journal. I hope you enjoy reading it; I certainly enjoyed being part of this editorial project.

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Cover photo:

Carrying Beribu: Three Canela women and one man carry a freshly-cooked manioc-meat beribu pie. Beribu is usually made from certain varieties of sweet manioc.

Photo by: Theresa Miller
Research report

Ethnoprimatology of Human-Bonobo gestural communication and conservation practices in post-war Democratic Republic of Congo.

Lys Alcayna-Stevens

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Keywords: Democratic Republic of Congo; ethno-primatology; multispecies ethnography; political ecology; post-colonial scientific knowledge.

My PhD research focuses on environmental anthropology and examines the relationship between the cosmology and everyday practices of the indigenous Bongando people, and their interactions with international conservation organizations working on development projects in exchange for wildlife reserves within their ancestral forests. I have conducted nearly 18 months of ethnographic research in the Democratic Republic of Congo in order to examine peoples’ relationships with their forests and wild/domestic animals, as well as the environmental politics surrounding great ape conservation.

Riley (2006) and others have argued that the emerging field of ethnoprimatology, which focuses on the ecological and cultural interconnections between human and nonhuman primates, has great potential to bridge the disciplines of biological and sociocultural anthropology. ‘Multispecies ethnography’ (Kirksey & Helmreich 2010) forms part of the recent turn in sociocultural anthropology, which aims to better appreciate human cultural and material worlds within a larger series of processes and relationships that exceed the human (Kohn 2007) – it was described as one of the ‘four main themes of particular significance in terms of theoretical intervention and methodological innovation’ in anthropology in 2010 (Hamilton & Placas 2011). My thesis also aims to speak to wider academic debates concerning environmental and indigenous politics, market-based environmental policy, the ‘frictions’ of encounter and post-colonial scientific knowledge.

In 2012, I undertook six months of preliminary ethnographic fieldwork among a euroamerican scientific community conducting their own field research on a community of great apes (the little-studied 'bonobo' (Pan
which is at the centre of many scientific and popular debates concerning 'human uniqueness' (cf. Quammen 2013) due to its status as the closest evolutionary relative of Homo sapiens). These field researchers work with local Congolese collaborators, in the central rainforest of northern Bandundu Province, Democratic Republic of Congo. During these six months, I examined scientific knowledge-making practices, as well as the relationships between scientists, villagers, state actors, 'poachers' and the great apes being studied.

While anthropologists studying scientists have increasingly moved away from the laboratory and into the field (cf. Latour 1999), few of these studies have examined scientists’ relations to the people and places in which they work. Building on contemporary debates in environmental anthropology which question the boundedness of communities and emphasize their links to wider political-ecological networks (Escobar 2008) in order to examine the ‘frictions’ (Tsing 2005) of encounter, I sought to examine the ways in which the scientists conceived of the perspectives of these local 'others' (including their attempts to fathom the perspectives and motivations of the great apes they were studying). My primary method was participant-observation; I collected data in the forest alongside the scientists, including the video and audio recording of bonobo vocal and gestural communication.

I became increasingly interested in the ways in which natural resources where conceptualized and inequalities in power, wealth, ownership and mobility were evoked and negotiated through the scientists' interactions with their Congolese collaborators in the heterotopia of their research camp – as well as the ways these interactions were mediated through, and enveloped by, the materiality of the forest and the other living beings within it (cf. Kohn 2013). I therefore moved to another fieldsite, where I was able to refocus my research, engaging with these questions from the perspective of local people.1

In 2013, I conducted 11 months of ethnographic fieldwork in south-eastern Equateur Province, Democratic Republic of Congo. The material gathered from this research will form the core of my doctoral thesis. My research focussed on the ways in which the Bongando (a multi-subsistence forest people of the Mongo ethnic cluster) negotiate with state and non-state actors interested in accessing and controlling their ancestral forests; from international nature conservation NGOs and scientists interested in bonobos, to the paramilitary Congolese Wildlife Authority and elephant poachers. I aim to ground local peoples’ aspirations and negotiations with state and non-state actors within broader Mongo cosmologies of capture, predation, influence and the redistribution of people, objects, animals and wealth.

My primary research method was participant observation. Other methods included: structured and semi-structured interviews with local and international NGO members, local politicians, local people and research scientists; in-depth

1 I returned to this original fieldsite in January 2014, and am currently preparing a paper which I hope to submit for publication in the next few months, examining and analysing the ethnographic material gathered at that site.
and open-ended ethnographic interviews and focus group interviews; audio recording of myths, proverbs and hunting stories; archival research at the Centre Équatoria in Mbandaka (DRC); film recording (including of human-animal interactions). Biosocial society support was specifically solicited in order to purchase the equipment necessary for audio and visual recording devices as well as a field laptop and the solar panel and battery necessary to charge this equipment in the field. This has been invaluable in enabling me to conduct my ethnographic and ethological research.

**Bibliography**


Farming in transition: land and property inheritance in a rural Polish population

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Keywords: inheritance; sex-bias; parental investment; demographic transition; Trivers-Willard.

Abstract

This paper examines inheritance practices in a Polish agricultural population where fertility is rapidly declining and traditional farming is being abandoned. Specifically, I examine how flexible inheritance transfers are, and whether they can be understood as part of a parental investment strategy in which parents strategically allocate resources to their children in ways that are likely to optimise their reproductive and/or social success. Using data on almost 2,000 women, I find that inheritance patterns are sex and birth order-biased, with a clear preference for male heirs and for ultimogeniture. However there is considerable flexibility depending on the size and sex composition of the family. There is evidence to suggest that parents are diversifying their investment strategies in negotiation with their offspring and in response to their future payoffs. Thus, male heirs tend to be less-highly educated than non-heirs. There is also evidence that male heirs inherit better-quality resources than do female heirs, consistent with a Trivers-Willard effect. I argue that fertility decline itself, by reducing the chances that an heir of the preferred sex is available, directly influences inheritance practices in farming populations. As land becomes less viable as a source of income, and an increasing proportion of females inherit, the abandonment of subsistence farming as a way of life is likely to accelerate.

Introduction

Evolutionary anthropologists assume that inheritance practices are culturally evolved strategies for ensuring that resources are transferred between the generations in ways that maximise inclusive fitness, paternity certainty, and intergenerational lineage stability (1-7). That humans make flexible, context-specific resource allocations is a cornerstone of evolutionary anthropology (8-11). As a result, we should expect parents to transfer their resources to their children in a way that maximises their likely reproductive
and/or social success in the future (12). However, few studies have examined the extent to which inheritance practices exhibit flexibility within a population while remaining locally responsive to the potential payoffs for offspring (4).

Inherited material resources are often crucial for marriage and reproductive prospects (13, 14), and in traditional subsistence populations where fertility is high, most parents are likely to have an heir of the preferred sex, so inheritance rules (e.g. exclusive primogeniture favouring males) may be unlikely to deviate from the norm. In contrast, in populations that are transitioning between subsistence livelihoods, especially where fertility is declining such that a greater proportion of families are unlikely to have an heir of the preferred sex (15), there may be more room for flexibility.

According to Trivers and Willard (1973), in populations where men have more variable reproductive success than women, and where resources are important to that variability, high-status parents should invest their resources preferentially in sons compared to their daughters, and lower-status parents should do the opposite (12). This facultative adjustment based on the wealth and/or status of the parents and thus, the environment the child is likely to inhabit, is expected to maximise reproductive success of the favoured sex. An implication of this hypothesis is that under conditions of subsistence transition, parents should adjust their investment strategies to reflect new types of resources that become increasingly important for social and reproductive success. Indeed, flexibility is to be expected in this situation, because the transition to a new subsistence economy may require adjustments to the ‘optimal’ allocation strategy, or may devalue the particular resource being transferred.

In this paper I examine how inheritance practices may be changing during the course of a demographic and subsistence transition in a mid-transitional farming population in rural Poland. I assess whether inheritance patterns of both land and property in this population can be understood as part of a parental investment strategy in which parents strategically allocate resources to their children. The data come from semi-structured interviews with 1,995 randomly sampled women aged 18-91, living in 22 randomly sampled communities (21 villages and one town) in the Beskid Wyspowy region of the lower Carpathians in the southern province of Malopolska. The data were collected between June 2009 and November 2010.

The study site is located in an economically disadvantaged area of Poland, characterised by centuries of peasant subsistence farming, and which was historically one of the poorest regions in Europe (16). The area is now undergoing a rapid transition away from farming and towards a more exclusive dependence on labour-market income sources. Although Poland has had a below-replacement fertility rate since the early 1990s, the study communities have remarkably higher fertility than national estimates would suggest (mean completed fertility in the sample is 3.81 [s.d. 2.15] children per woman). Households are multigenerational and range in size from one to 15 inhabitants,
with an average of 5.36 inhabitants (s.d. 2.27) at the time of the survey. Nonetheless, fertility is declining (23, 24).

A shortage of arable land and a long history of partible inheritance in this region, stretching back at least to the 18th century, has reduced plot sizes dramatically and made farming a relatively difficult enterprise. As far back as 1899, over 80% of peasant farmers in this region of Poland owned less than 5 acres of land (17). In the study area, holdings tend to be scattered across numerous strips of land, often far away from the farmhouse, making efficient farming difficult. Indeed the study communities are situated in an isolated area with poor soil and long, hard winters, which, as noted by other anthropologists, was never particularly well suited to farming (18). Plot sizes today remain small; mean total land ownership in the sample is 2.33 hectares (s.d. 2.81) and there is large inequality in plot sizes with a right-skewed distribution; median plot size is 0.25 hectares. Mean arable plot size is just under one hectare (mean = 0.90, s.d. 1.35). Land quality in the study communities is poor, with more than 80% of farming households in the sample owning land that is classified in the lowest official grades, from classes 4 to 6. Of the 53% of households who actually work the land they own, 9% say they cannot use any form of mechanized equipment because of the poor terrain, with 16% of all farmers doing most or all of the farm work by hand. Nonetheless, 65% of all sampled households derive some subsistence goods from their own cultivated produce, with 29% producing half or more of their household’s food in the winter and 35% producing half or more of their own food in the summer. The same range of crops and products are cultivated today as in the peasant past, with most families growing potatoes, vegetables and fruits, and those owning livestock also growing wheat, rye, triticale (a hybrid of the two) and mangel beets for animal fodder. Over 56% of farmers in the sample keep at least one cow, from which they can make their own cheese in addition to obtaining milk and cream (cattle are rarely used for meat). Bee keeping is also popular in the study area. 21% of farmers in the sample keep rabbits, 77% keep fowl, 8% sheep, 13% horses, and 15% pigs. Seasonal foods such as mushrooms and blueberries are gathered in the local forests, and those who own forested land can additionally use their wood for heating.

Despite the hardship that it involves, the desire to remain farmers, if at all possible, remains strong. 48% of respondents said they would like their family to continue farming into the future. However, the changes wrought in recent generations are marked: only 4% of the sample now obtains their main source of income from farming, compared to over 65% of respondents’ families in childhood (Table 1). Table 1 describes the most important sources of income in the sample in (A) respondent’s childhood households, and (B) their households at the time of the survey in 2009/2010. Currently, over 65% of respondents (n = 1,255) live in households still practicing subsistence farming in addition to other income-generating activities. However there is a great deal of variation in income-
generating strategies in this population, with 28% of households subsisting mainly on state benefits, pensions and subsidies, and 65% deriving their principal source of income from the wage-earnings of householders.

Following the German and Soviet occupations of Poland during the 20th century, the transition to a market economy in 1989-1991 led to an unprecedented increase in poverty and inequality among households in Poland (19). The farmers in the study region, whose land had not been successfully collectivised under state socialism, were able to partially buffer themselves against the dramatic economic changes under rapid trade and economic liberalization, known as ‘economic shock therapy’. Nonetheless, during the period 1989-2001 when the Polish farm sector was opened up to market competition, national statistics show that 12% of all farmers in Poland, including those living in the study area, lived below the subsistence minimum, 26% lived below the relative poverty line i and 68% lived below the social minimum ii (20). In 2000, ~29% of the rural population of Poland, which encompasses the study area, were still estimated to be living under the relative poverty line (19). Many state-provided institutions that were available under state socialism were withdrawn after transition to market economy, so farmers in this region no longer benefit from institutions such as mills, meaning they no longer make their own bread. The removal of state support following the collapse of socialism also led to a sharp fall in the use of fertilisers and pesticides, further reducing the productivity and efficiency of farms.

The maintenance of a way of life consistent with subsistence farming has become even more difficult since Poland’s accession to the EU in 2004 (21). Almost 40% of Polish farmers with less than 10 hectares of land are estimated to be poor by the national office of statistics (22). In the study area, farmers with small plots of land have no means to compete with industrial farmers further afield, so price and trade liberalization does not allow them to gain much surplus income from seasonal cash cropping. The only relatively profitable source of income is from livestock production and dairying, which only the wealthiest farmers can afford. Poorer farmers in the study area tend to be older, and their families are usually the substratum most dependent on the land for subsistence because they tend to have lower levels of formal education and fewer prospects for off-farm work. Dependence on farm work as a source of food also necessarily leaves less time for off-farm work. Farmers at the poorest end of the socioeconomic scale – those with less than a hectare of land, yet who depend

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The subsistence minimum (defined in 1995 by the Institute of Labour and Social Studies, the Office of National Statistics and the World Bank) refers to the minimal level of subsistence needed to avoid physical collapse/illness, and is a measure of very low income. The subsistence minimum is more than twice lower than social minimum (see 3). The relative poverty line (as calculated by the Polish Office of National Statistics) is equal to 50% average expenditure per unit of consumption, weighted by number of householders. The social minimum refers to a poverty measure of ‘minimum material security’ developed in former Soviet block countries. It was designed to capture the indispensable minimum level of consumption (both economic and cultural) needed for social participation and integration. This is not an explicit measure of poverty per se, but is used as a symptom of poverty.
TABLE 1.

Main sources of income as reported by respondents in (A) their childhood households’, and (B) at the time of the survey in 2009/2010

<table>
<thead>
<tr>
<th>Primary source of income</th>
<th>(A) Childhood (n = 1864)</th>
<th>(B) 2009/2010 (n = 1993)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming</td>
<td>1,213</td>
<td>88</td>
</tr>
<tr>
<td>Wage remittance</td>
<td>624</td>
<td>1,297</td>
</tr>
<tr>
<td>Social welfare</td>
<td>14</td>
<td>559</td>
</tr>
<tr>
<td>Mixed - farm &amp; wage</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Mixed - farm, wage, welfare</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Mixed - wage &amp; welfare</td>
<td>.</td>
<td>29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proportion</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.65</td>
<td>0.65</td>
</tr>
<tr>
<td>0.33</td>
<td>0.28</td>
</tr>
<tr>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

on farming for some part of their subsistence – do not substantially benefit from the subsidies and credits designed by the EU to help restructure peasant agriculture, which are usually based on a per hectare basis (19, 21). Considering the fact that the mean arable plot size in the study region is less than 1 hectare (23), the farmers in the study area must be considered one of the most vulnerable sections of the population.

In a context where plots are small and labour important to the productivity of the land, inheritance usually passes to one heir only, with a generally stated preference for male heirs and a desire for multiple sons to work the land. Ultimogeniture (i.e. the youngest child inheriting) is assumed to be the prevailing inheritance practice, and it is common for one child to inherit the land while another inherits the house, depending on the composition and size of the family, and the plans for farming in the future. The land is not usually subdivided but is sometimes parcelled into construction plots for children to build their own houses on. Given the changing outlook for farming as the population becomes more dependent on wage-labour income, and as family sizes decrease, parents appear to be diversifying their investments away from the land, particularly focusing on the education of their children. This paper attempts to systematically analyse these ethnographic observations. As such, it is intended to provide a quantitative assessment of the typical direction of inheritance transfers, the sex-biases that exist in these transfers, and the possible future directions for land and property inheritance, and indeed farming, in this population.

Data description and analysis

For each respondent (n = 1,995) and her husband (n = 1,498), I created indicator variables of whether they had ever owned the family's house or land, or if they have not yet inherited, whether they stood to inherit them in the future. These binary inheritance-status variables (0 = did not inherit, 1 = inherited/stands to inherit) indicate whether each individual is or ever was heir to their own family’s land and/or property. An individuals’ inheritance status was calculated using three-generational data on the ownership of land and property in the family and on
the direction of inheritance transfers (i.e. in each instance whether land or property was inherited from the father’s or the mother’s side of the family). Since married couples often claimed they owned land or property jointly, the previous owners were used to determine from which side inheritance had been transferred. Where property/land was inherited from a now-deceased spouse, the living partner was coded as a non-heir, and the deceased husband/wife was instead coded as the heir.

Table 2. describes the general distribution of inheritance transfers in the sample. Out of a total of 1,620 married couples, 85% (n = 1,380 couples) inherited some land and 45% (n = 721 couples) inherited some property, with 15% (n = 240 couples) not inheriting anything. Of those couples inheriting land, the majority (51%) inherited from the husband’s parents, and of those couples inheriting property, the majority (55%) inherited from the wife’s parents. Couples frequently build their own homes upon marrying, so it is relatively uncommon for both property and land to be transferred together; only 22% of couples inherited both land and property together from the wife’s parents, and 19% of couples inherited both from the husband’s parents. There were no cases where both spouses in a couple were heirs to both property and land from both sets of parents, and only 13 cases (1% of couples) where both spouses inherited either land or property from both sets of parents.

TABLE 2.

Distribution of inheritance transfers among married couples.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>% of couples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total couples</td>
<td>1620</td>
<td>100%</td>
</tr>
<tr>
<td>Couples inheriting land</td>
<td>1380</td>
<td>85%</td>
</tr>
<tr>
<td>Couples inheriting property</td>
<td>721</td>
<td>45%</td>
</tr>
<tr>
<td>Couples inheriting land from husband’s family</td>
<td>710</td>
<td>51%</td>
</tr>
<tr>
<td>Couples inheriting land from wife’s family</td>
<td>670</td>
<td>49%</td>
</tr>
<tr>
<td>Couples inheriting property from husband’s family</td>
<td>323</td>
<td>45%</td>
</tr>
<tr>
<td>Couples inheriting property from wife’s family</td>
<td>398</td>
<td>55%</td>
</tr>
<tr>
<td>Couples inheriting both land &amp; property from wife’s family</td>
<td>359</td>
<td>22%</td>
</tr>
<tr>
<td>Couples inheriting both land &amp; property from husband’s family</td>
<td>309</td>
<td>19%</td>
</tr>
<tr>
<td>Couples inheriting either land or property from both sides</td>
<td>13</td>
<td>1%</td>
</tr>
<tr>
<td>Couples not inheriting anything</td>
<td>240</td>
<td>15%</td>
</tr>
</tbody>
</table>

The fact that few couples inherit from both sides of the family partly reflects the incompatibility of maintaining two separate farms, often located in different villages, and maintaining or obtaining a marriage partner. However it may also indicate a preference by parents to differentially transfer inheritance to children depending on the inheritance status of their spouses. Since property is not transferred until later in the parents’ lives, they may have ample time in which to optimise their transfer.
strategies to benefit as many children as possible.

Table 3 shows the ratio of wives to husbands inheriting both property and land in each of the birth cohorts in the data. The table indicates that, over time, there has been a secular increase in the proportion of women inheriting both property and land, relative to their husbands. Given that fertility has been steadily declining across these age-cohorts (23, 24), this pattern suggests that women are indeed inheriting their parents’ assets more often as overall family sizes in the population decline. Note that the most recent birth cohort shows a drop in the ratio of women inheriting, but this does not represent all women in this age-group as it necessarily only includes those women who have married young.

Table 3.

<table>
<thead>
<tr>
<th>Wife’s birth cohort</th>
<th>Husbands</th>
<th>Wives</th>
<th>Ratio of wives to husbands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born before 1930</td>
<td>19</td>
<td>15</td>
<td>0.79</td>
</tr>
<tr>
<td>Born 1931-1940</td>
<td>65</td>
<td>64</td>
<td>0.98</td>
</tr>
<tr>
<td>Born 1941-1950</td>
<td>80</td>
<td>103</td>
<td>1.29</td>
</tr>
<tr>
<td>Born 1951-1960</td>
<td>99</td>
<td>148</td>
<td>1.49</td>
</tr>
<tr>
<td>Born 1961-1970</td>
<td>113</td>
<td>149</td>
<td>1.32</td>
</tr>
<tr>
<td>Born 1971-1980</td>
<td>104</td>
<td>165</td>
<td>1.59</td>
</tr>
<tr>
<td>Born 1981-1992</td>
<td>190</td>
<td>66</td>
<td>0.35</td>
</tr>
</tbody>
</table>

To examine more rigorously whether inheritance transfers follow a predictable pattern, I used multivariate logistic regression to estimate the probability of inheriting the land and/or property of one’s parents based on the number of brothers (range = 0 to 11, mean ~2) and sisters (range = 0 to 11, mean ~2), on birth order, and on education for both women and men. 49 women and 32 men had no siblings. Education was measured as the highest formal level reached, ranging from 0 = none/some primary (n = 21 women; 17 men); 1 = full primary (n = 320 women; 358 men), 2 = vocational (n = 525 women; 849 men), 3 = secondary (n = 816 women; 300 men) and 4 = tertiary (n = 313 women; 99 men). The outcome variable in each case is a binary category (did not inherit = 0, inherited = 1), so that each model gives the log-odds of inheriting based on a unit increase in the predictor, net of other factors. To test whether the preference for ultimogeniture is more flexible when the sex-composition of the family is female-biased, I included interactions between the focal individual’s birth-order and an indicator of whether they had any brothers or not.

Results

Ultimogeniture is the generally preferred inheritance practice

The logistic regression models show that there is indeed a strong preference for ultimogeniture for both land and property transfers, as indicated by significant birth-order effects for both
For women, each increase in birth order (i.e. being later-born) is associated with a 17% increase in the odds of inheriting land (OR = 1.17, 95% CI [0.09, 0.23]), and a 21% increase in the odds of inheriting both land and property together (OR = 1.21, 95% CI [0.10, 0.29], Table 4B). These effects are independent of controls for education and birth cohort.

### TABLE 4.

**Multivariate logistic regressions of the probability of inheriting either land, property or both land and property together for (A) women and (B) men.**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Land</th>
<th>Property</th>
<th>Land &amp; Property</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR 95% CI</td>
<td>z-value p &gt;</td>
<td>OR 95% CI</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.51 -0.08 -2.22 0.026</td>
<td>-</td>
<td>0.47 -1.30 -0.02 -2.01 0.045</td>
</tr>
</tbody>
</table>

**Birth order**
- Born before 1930
  - Women: 2.64 0.27 1.67 2.73 0.006 -
  - Men: 3.52 0.26 1.37 3.42 0.001 -
- Born 1931 - 1940
  - Women: 1.80 0.16 1.01 2.70 0.007 -
  - Men: 1.06 0.12 0.51 1.28 0.202 -
- Born 1941 - 1950
  - Women: 1.33 -0.08 0.64 1.54 0.124 -
  - Men: 0.92 -0.18 0.01 1.78 0.075 -
- Born 1951 - 1960
  - Women: 1.07 -0.25 0.39 0.44 0.660 -
  - Men: 1.22 -0.11 0.51 1.28 0.202 -
- Born 1961 - 1970
  - Women: 0.89 -0.42 0.18 -0.76 0.448 -
  - Men: 1.59 -0.27 0.93 3.25 0.001 -
- Born 1971 - 1980
  - Women: 1.59 -0.27 0.93 3.25 0.001 -
  - Men: 0.92 -0.18 0.01 1.78 0.075 -

**Model fit and summary**

<table>
<thead>
<tr>
<th>Sample size</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Women</td>
<td>1995 2432 8122</td>
</tr>
<tr>
<td>(B) Men</td>
<td>1995 1730</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Land</th>
<th>Property</th>
<th>Land &amp; Property</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR 95% CI</td>
<td>z-value p &gt;</td>
<td>OR 95% CI</td>
</tr>
<tr>
<td>Intercept</td>
<td>1.40 0.32 1.00 1.01 0.314</td>
<td>-</td>
<td>1.13 -0.67 0.91 0.30 0.764</td>
</tr>
</tbody>
</table>

**Birth order**
- Born before 1930
  - Women: 1.28 0.40 0.89 0.74 0.457 -
  - Men: 0.81 0.29 0.13 -0.13 0.542 0.000 -
- Born 1931 - 1940
  - Women: 1.46 -0.13 0.90 1.44 0.150 -
  - Men: 0.92 -0.18 0.01 1.78 0.075 -
- Born 1941 - 1950
  - Women: 2.38 0.37 1.37 3.42 0.001 -
  - Men: 0.92 -0.18 0.01 1.78 0.075 -
- Born 1951 - 1960
  - Women: 2.59 0.50 1.42 4.08 0.000 -
  - Men: 0.92 -0.18 0.01 1.78 0.075 -
- Born 1961 - 1970
  - Women: 2.52 0.48 1.39 4.01 0.000 -
  - Men: 1.25 -0.26 0.73 0.91 0.365 -
- Born 1971 - 1980
  - Women: 2.06 0.28 1.18 3.15 0.002 -
  - Men: 1.27 -0.24 0.74 0.95 0.341 -

**Model fit and summary**

<table>
<thead>
<tr>
<th>Sample size</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Women</td>
<td>1498 1498 1498</td>
</tr>
<tr>
<td>(B) Men</td>
<td>1967 1418 1385</td>
</tr>
</tbody>
</table>
in the models on women’s’ inheritance of property, and land and property together. This interaction reveals that the preference for ultimogeniture in these latter transfers is less pronounced when there are no male heirs to inherit, i.e. there is a flattening out of the birth-order effect when women are the only possible heirs (Table 4A). There were no significant interactions when it came to women’s inheritance of land or indeed in any of the models on male inheritance probabilities.

Parents prefer to transfer land to males

There appears to be a strong sex-bias favouring men in inheritance transfers, since only the number of brothers, but not sisters, has an effect on a man’s odds of inheriting any assets. For every additional brother, men have a 19% reduced odds of inheriting land (OR = 0.81, 95% CI [-0.29, -0.13]), a 31% reduced odds of inheriting property (OR = 0.79, 95% CI [-0.34, -0.13]) and a 20% reduced odds of inheriting both assets together (OR = 0.80, 95% CI [-0.32, -0.12], Table 4B). Interestingly, in the case when there is only one male in the family, i.e. when a man has no brothers, he has significantly decreased odds of inheriting property (OR = 0.42, 95% CI [-0.66, -0.13], or land and property together, (OR = 0.47, 95% CI [-0.54, -0.01] Table 4B), although his probability of inheriting land remains unchanged.

In contrast to the results for men, a woman’s odds of inheriting are negatively affected by both the number of brothers and sisters she has, such that for every additional brother, her odds of inheriting all assets are reduced by 24% (Table 4A), and for every additional sister her odds of inheriting land are reduced by 22% (OR = 0.78, 95% CI [-0.35, -0.15]), her odds of inheriting property reduced by 20% (OR = 0.80, 95% CI [-0.36, -0.10]) and her odds of inheriting both land and property together reduced by 23% (OR = 0.77, 95% CI [-0.41, -0.13], Table 4A). In contrast to the result for men, there are no significant differences in inheritance probabilities for women where they are the only daughter in the family.

Parents transfer inheritance to less-educated sons

For men, there is a strong negative correlation between education and the odds of inheriting all assets (Table 4B), indicating that lower, rather than higher-educated sons are more likely to inherit. Every unit increase in male education is associated with a 26% reduction in the odds of inheriting land (OR = 0.74, 95% CI [-0.40, -0.20]), a 26% reduction in the odds of inheriting property (OR = 0.74, 95% CI [-0.43, -0.17]), and a 26% reduction in the odds of inheriting both land and property together (OR = 0.74, 95% CI [-0.46, -0.17]). For women in contrast, education is not significantly associated with inheritance probabilities (Table 4A).

Male heirs have more viable farms than do female heirs

There is some evidence in favour of a Trivers-Willard effect in the transfer of farms in this population, such that men who inherit land receive better-quality resources than women who inherit. Table 5 shows that men inherit significantly larger total plot sizes and
more hectares of viable farmland than do women. Men who have inherited also have significantly more dairy cattle – the primary means of earning surplus income from farming – than do women who inherit.

**TABLE 5.**

*Farm viability varies depending on the sex of the heir. When men inherit, farms are significantly larger, of better quality and have more cattle than when women inherit.*

<table>
<thead>
<tr>
<th>Wife inherits</th>
<th>Husband inherits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mean</strong></td>
<td><strong>s.d.</strong></td>
</tr>
<tr>
<td>Total land (hectares)</td>
<td>2.12</td>
</tr>
<tr>
<td>Arable land (hectares)</td>
<td>0.79</td>
</tr>
<tr>
<td>Number of dairy cattle</td>
<td>0.68</td>
</tr>
</tbody>
</table>

Welch t-tests assuming unequal variances. All differences are significant at the *p < 0.001* level.

**Discussion**

This analysis reveals an interesting picture of inheritance transfers in this transitioning population. The broad finding is that inheritance preferences are flexible and can be understood as part of a responsive parental strategy to allocate resources amongst their children, potentially in a way that optimizes their social and/or reproductive outcomes. Ultimogeniture is the predominant inheritance pattern, but when only female heirs are available and the resource being transferred is property or land and property together, ultimogeniture is less important. Inheritance transfers are generally strongly biased toward sons, however men are less likely to inherit property, or property and land together, when there is only one son in the family. The same is not true in the analogous situation for daughters.

Why is there a switch to daughter-preference when there is only one son available for transfers of property, or property and land together? The answer may lie in the strong differences in the odds of inheritance between more- and less-educated sons. Men, but not women, are less likely to inherit across the board when they are more highly educated. This might be because highly educated men are more likely to decline inheritance transfers, preferring instead to pursue non-farming livelihoods, which they are better qualified to do, or alternatively this may reveal a parental transfer strategy that is strongly responsive to men’s prospects for income-earning potential. When there is only one son in the family, the incentives to stay at home and work the land are not strong, since sons are often expected to provide for the household, but the remittances from other sources of labour are usually much higher than those from either farming alone or a combination of farm and off-farm work (25). Indeed parents may avoid transferring property or both land and property to sons in this situation to enable them to maximise their advantages in the labour market.

This negotiation between farming and men’s education may therefore reflect a parental investment strategy that favours strategic investment in sons depending...
on the types of resources that may be most advantageous to them. Certainly, when parents do transfer land to sons, the land is of better quality and the farms are more productive. Since men who inherit higher quality resources are expected to have higher fitness returns than women who inherit high quality resources (12), this result is consistent with a Trivers-Willard effect.

Inheriting the family house brings with it caretaking responsibilities for ageing parents, which usually increases rather than decreases the financial burden on heirs in this population (for similar arguments see 26, 27). Any siblings who do not marry usually also remain in the family home. In practice, property is often bequeathed near the end of the parents’ lives. If the heir in question has not married by then, this situation often exacerbates rather than ameliorates poverty, since leaving the village to work is not an option, and finding a marriage partner can remain problematic, since another farm or income source will be needed. Not having the resources to build one’s own house is also increasingly seen as a sign of poverty, one that usually befalls poorer couples and unmarried people. These factors may also account for the finding that women are more likely to inherit property, and property and land together, when there is only one son in the family.

Taken together, the results suggest that inheritance patterns in this population reflect a negotiation between parental investment strategies and the wishes of their sons, such that some sons receive parental investments in the form of land inheritance, and others pursue education. The fact that almost no couples receive inheritance transfers from both sides of the family strongly indicates that parents take into account the inheritance prospects in the spouse’s family when planning their transfer strategy to their own children. Although plot sizes in this population are generally small (< 5 hectares), conditions for farming are undoubtedly better when there are multiple males available to work the land. Thus, in families where a critical mass of sons is not available to make farming a viable income source, it would make sense both for parents to transfer these resources to daughters, and for sons to invest more highly in their own education. The outcome is that that women are increasingly inheriting their parents’ assets, and when they do, the farms are less viable.

In the changing context of farming in this population, farmers who want to maintain their livelihoods must transfer their farms in a way that is most beneficial to the family. However, as a result of diversifying parental investment strategies to include the education of children, in a context of shrinking family sizes, women are increasingly inheriting farms. Since farming is neither a dependable nor a lucrative income source, both husbands and wives will increasingly seek alternative income-generating options, but those who depend on the land for subsistence are also likely to become increasingly impoverished. These dynamics have a number of implications.

In line with the Trivers-Willard hypothesis (12), it may make sense for parents to preferentially cede their farms to women as they increasingly invest...
Child-rearing practices in student-mothers in Ghana

I am indebted to all of the women who took part in my study as well as my field assistants from all stages in the project, the Wojtas and Markiewicz families for accommodating me in the field, and the parish Rectors of Limanowa county for help in advertising the project. I thank my collaborators at the Jagiellonian University of Krakow, Grazyna Jasienska, Andrzej Galbarczyk and Ilona Nenko, without whom this research would not have been possible, and Ruth Mace, who supervised the project. I also thank two anonymous reviewers for comments. This study was funded by grants from the ESRC, the Wenner-Gren Foundation for Anthropological Research (Dissertation Fieldwork Grant 8182) and Osmundsen Initiative, the Gay Clifford Fund, the UCL Graduate School and the ERC (Grant AdG12 249347).

Acknowledgments

their resources in the education of their sons, potentially leading to higher rates of male out-migration. There are at least three outcomes for inheritance practices and post-marital residence patterns in the future as a result. First, the prevalence of uxorilocal (wife’s family) over virilocal (husband’s family) post-marital residence may increase where land and subsistence farming remains important to livelihood, since men will more often have to move to their spouse’s village. Second, future transfers may start to be directed away from the nuclear family in order to secure male heirs, or plots may be sold (a relatively unlikely possibility given the poor quality of the land for either farming or construction). The third and most likely outcome is that the pace with which farming is being abandoned will rapidly increase as the proportion of female heirs increases. A large proportion of the families in the villages I surveyed had stopped systematically producing food in the last 3 to 5 years, and slaughtered or sold off their livestock. Difficult terrain and short growing seasons means that labour is a strongly limiting factor for farm productivity in this population. Thus while land is usually considered the most important limiting factor in European traditional agricultural systems (compared to African ones where land is not especially limited), labour is becoming more of an impediment to farming here as family sizes decline. Whichever turns out to be the case, it is clear that incremental changes in fertility decline itself will directly influence the inheritance practices, dispersal patterns and the dissolution of the farming way of life in this population.

Bibliography


Child-rearing practices among student-mothers at University of Cape Coast, Ghana.

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Keywords: University, student-mothers, education, challenges, coping strategy

Abstract

It has been argued that countries can achieve most Millennium Development Goals if female education becomes a priority. Although Ghana has reduced the gender gap in education over the last two decades, less emphasis has been placed on the challenges student-mothers face on campus. The study explored such challenges and how student-mothers cope at the University of Cape Coast. The study, guided by the bio-psychosocial model, adopted a qualitative approach to reach twenty-eight respondents for in-depth interviews. It was realized that respondents usually skipped lectures and tutorials to take care of their babies. Stigma and uncooperative attitude of some lecturers increased their psychological stress. These collectively affected their academic activities. Emotion-focused coping strategies such as remaining indoors and crying were mostly used. While the University must develop a policy on the subject, its Counseling Unit must intensify the education on problem-focused coping strategy.

Introduction

Undoubtedly, (formal) education is one of, if not the, most empowerment tools for human development. It has been argued that female education is critical to achieving particularly the first five Millennium Development Goals (MDGs) (Clark, 2010; UNESCO, 2010). A number of (developing) countries including Ghana have implemented various interventions not only to enable them meet the third MDG, but also to encourage the upward education of females especially to the tertiary level through affirmative action. For instance, in Ghana, the Kwame Nkrumah University of Science and Technology (KNUST) has a quota for female students in the sciences while the University of Cape Coast (UCC), in addition, has a female admission cut-off grade point for most of the faculties.
lower than that of the male admission cut-off grade point.

Most of the Universities in Ghana have also broadened their scope of admission. Currently, apart from direct entry admission, there are other modes, such as the mature-entry and sandwich programmes tailored to suit the needs of categories of individuals and groups. These interventions have contributed to an increasing enrollment of women in particular in some of the tertiary institutions. For example, there has been a consistent increase of female enrollment at UCC: from 2000-2001 to 2010-2011 academic years, female enrollments have increased from 15% to 35% (UCC, 2010). The University admits different categories of students comprising regular, sandwich and distance learning students.

There is no comprehensive information on student-mothers at UCC. Perhaps, this can be attributed to the fact that the University does not have a specific policy on the subject. Given the varied needs and challenges of student-mothers (in relation to their academic work), emphasis also needs to be placed on issues that touch on student-mothers and their children. The study therefore explored child-rearing practices by student-mothers on campus. It assessed the associated challenges, in relation to their academic activities at UCC and discussed the strategies adopted to cope with such challenges.

**Literature Review and Theoretical Framework**

The education of girls on the African continent has improved significantly. As indicated by Randell, et al. (2009), the gender gap has lessened tremendously over the last decade and a half, owing to high priorities placed on girls’ education in national, continental and international education agreements, conventions and policies, such as education policies regarding the girl child, poverty reduction and economic development strategies, the Millennium Development Goals (MDGs) and the Education for All (EFA) campaigns.

Education is contemporary regarded not only as a tool for development, but also a right. This right has been enshrined and strengthened in national and international laws, conventions and protocols such as the Human Rights Act, 1998. The 1992 Constitution of Ghana also provides every citizen in Ghana a right to education. At the basic level (grades 1-9), it is illegal under the Constitution for a child not to be in school. The introduction of the Free Compulsory Universal Basic Education (FCUBE) and the establishment of the Capitation Fund in 2004 have come to strengthen this constitutional provision.

After the Beijing Conference in 1995, emphasis has been placed on gender equality. The rights (including reproductive rights) and empowerment of females has now become a crucial tool for development. For instance, the Target 4 under the MDG 3 commits member countries to eliminate gender disparity in primary and secondary education preferably by 2005, and at all levels by 2015. Some have even argued that education of women and girls constitutes a breakthrough for achieving all the MDGs. Indeed, the Administrator of UNDP by name Helen Clark holds
this view. She said in 25th March, 2010 that:

*I believe that investing in women and girls in itself constitutes a breakthrough strategy for achieving the MDGs, and that almost any investment we make in women and girls will have multiplier effects across the Goals* 
*(see www.oecd.org/dac)*

These, among many other reasons, have informed the implementation of interventions to increase female enrollment at all levels in Ghana. Notwithstanding, reproductive careers of females coupled with their socio-cultural and economic responsibilities have the potential to impede the academic endeavours of women. Generally women are noted to playing multiple roles. For instance, in her research, Oppong (1980) had recognised that women, in Ghana in particular and Africa in general, play numerous roles at home, in the family, society or community and also at work. Therefore, being a parent on campus is likely to have a much greater effect on studies for women than for men.

In their subsequent studies, Oppong and Abu (1987) developed the seven roles framework which examines the multiple roles women play in Ghana. The framework explains that women play, to greater or lesser extents, maternal, occupational, conjugal, domestic, kin, social and individual roles (Oppong and Abu, 1987). The framework is appropriate for this study in the sense that student-mothers are likely to perform these seven roles even on campus in addition to their studies. Culturally, such roles are largely gendered. Although males have roles to play, it is a common knowledge in Africa and Ghana that much of such roles including child-rearing practice are performed by females generally.

Combining these seven roles with academic work is more likely to increase the stress and challenges student-mothers face. These consequently have implications and likely impacts on their studies as well. To analyse such implications, the present study adopted the bio-psychosocial model originally developed by Engel (1977). The model describes three main interrelated factors, namely, biological, psychological and social (BPS) factors or challenges that play significant roles in human health and wellbeing (Engel, 1977). The BPS model, although about three and half decades old, is still relevant in contemporary studies today (Adler, 2009). Indeed, Adler used the BPS model based on systems theory and on the hierarchical organization of organisms but extended it by the introduction of semiotics and constructivism to describe the relationships between the individual and his environment and to explain how an organism perceives his environment respectively.

The BPS model provides the key interrelated areas and sources of stressors that affect physical, psychological and social wellbeing of people. As defined by WHO in its Constitution, ‘health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’ (WHO, 2006, p1). The current study adapts the BPS model not only because it is relevant in contemporary studies (Adler, 2009), but
because it also provides nearly all the factors (or sources of stressors) students-mothers are likely to face on campus. However, it includes economic factors as a related factor to the original model (Table 1) for the purposes of the study.

TABLE 1.

Description of adapted bio-psychosocial model: factors acting on health and wellbeing

<table>
<thead>
<tr>
<th>Biological factors</th>
<th>Psychological factors</th>
<th>Social factors</th>
<th>Economic factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal-related factors (e.g. reproductive and hormonal issues, fatigue, etc.)</td>
<td>Academic stress (e.g. early attendance to lectures, inability to meet assignment deadlines, participate in examinations), emotional stress (e.g. uncompromising attitudes of lecturers, stigma etc.)</td>
<td>Social factors (e.g. access to spouse, family, friends, lecturers, leisure, etc).</td>
<td>Economic factors (e.g. adequate/inadequate funds for academic fees, books, handouts; accommodation, feeding; drugs, clothing, and other logistics)</td>
</tr>
</tbody>
</table>

Source: Based on Engel (1977).

Strategies adopted to deal with challenges are conceptualized as coping strategies. Anspaugh et al., (2003) define coping strategies as ‘survival skills’ available for people to deal with or manage challenges or problems associated with biological, psychological and social challenges. Two main coping strategies have largely been discussed. These are the problem-focused and emotion-focused coping (Folkman and Lazarus, 1980; 1984). Problem-focused coping seeks to solve or change the source of problems by gathering information, analyzing and making rational decisions to deal with a problem or challenge (Holt, et al., 2005). On the other hand, emotion-focused coping aims to reduce or manage the emotional distress associated with problems by seeking emotional support (Lane, Jones and Stevens, 2002; Crocker et al., 1998, cited in Lawrence, Ashford and Dent, 2006) or, for example, having a drink and using drugs.

It must however be emphasized that the use of any coping strategy does not always lead to or necessarily result in success. Notwithstanding, problem-based coping strategies are usually recommended. This is because problem-focused coping strategies aim at actively dealing with the problem. In contrast, emotion-focused coping is directed at dealing with the emotional distress that is evoked by the problem (Pienaar and Rothman, 2003).

A third coping strategy that has been suggested by Endler and Parker (1990) (cited in Pienaar and Rothmann, 2003) is avoidance. In reality, the avoidance coping strategy takes the person away from the stressful environment or the stressor unlike problem-based and emotion-focused coping where the person remains in and tries to manage the stressful situation (Kowalski & Crocker, 2001). However, Kashden et
al., 2006 classifies avoidance as an emotional-based coping strategy.

Endler and Parker (1990, cited in Pienaar and Rothmann, 2003) suggest that the third basic strategy that may be used in coping with stress is avoidance. Avoidance can include either person-oriented or task-oriented strategies. Avoidance differs from problem- and emotion-focused coping in that avoidance of a situation actually removes the person from the stressful situation, whereas whereas problem-based and emotion-focused coping enables a person to remain in and manage the stressful situation (Kowalski & Crocker, 2001).

The study context

The University of Cape Coast started as University College of Cape Coast placed in special relationship with the University of Ghana. After its formal inaugurated in 1962 under the name ‘The University College of Science Education’, it was entrusted with the task of training graduate teachers in Arts and Science. Following a change in government in 1966, the College reverted to its original name of the University College of Cape Coast. It later gained a full university status in 1971. Presently, the University has decoupled the study of professional education courses from the main degree courses to allow flexibility and choice in its course offerings and thus, cater for specific needs of students, while focusing on its traditional mandate of training highly qualified and skilled manpower in education.

The University operates with nine (9) Faculties/Schools. Plans are far advanced to establish a Faculty of Law to meet the contemporary requirements of students and society. Currently, there are three main modes of admission to pursue courses in the University. These are the regular, distance learning and sandwich programmes. In other to respond to the needs of undergraduate students from less-endowed areas and schools, the University admits into its programmes through other modes. These are the Science Remedial Programme, Mature Students’ Examinations and Concessionary Selections from deprived schools.

The student population of the University has seen a consistent increase in enrolment from an initial figure of 155 in 1963 to 48,182 for the 2012-2013 academic year comprising 17,034 Regular Students, 2,800 Sandwich Students and 28,343 Distance Learning Students. The total population consists of 30,243 (62.8%) males and 17,939 (37.2%) females. It must however be emphasised that the University over the years has consistently increased female enrolment. For instance, there was an increase in female intake from 30.3% to 36.3% in the 2011-2012 and 2012/2013 academic years respectively (UCC, 2011, 2010).

The student population at UCC includes married and unmarried men and women of different ages. With the median age of first sex in Ghana around 17 years for females and 19 years for males (Ghana Statistical Service et al., 2009), the majority of the student population is likely to be sexually active. The University therefore, in its Students’ Handbook, promotes the use of safer-sex practices.
**Data and Methods**

The study adopted the accidental and snowball technique to identify 28 student-mothers on campus for in-depth interviews. The post-natal unit of the university hospital was used to contact student-mothers to schedule dates and time for interviews. The respondents then gave their location of residence as well as telephone numbers to reach them on agreed dates for the interviews. After each interview, the respondent called other student-mothers to inquire about their willingness to participate in the study. Those who consented were reached for interviews. This process (known as snowballing) was followed until the interview ended with the 28th respondent when saturation appeared to have been reached, in that no new themes were emerging from interviews.

This technique was used because not all student-mothers attend post-natal clinic at the university hospital. Again, the University (hospital) does not have records of all student-mothers. The interview guide and a digital recorder, a notebook and writing logistics comprised the research instrument and other support logistics that were used to collect the data.

All the interviews were conducted at the residence of the respondents. On few occasions, the interviews were paused to allow the respondents to (breast) feed the babies or attend to them when the need arose. On the average, an hour was spent to interview a respondent. The first semester of the 2010-2011 academic year was used to collect the data.

**Results**

**Background characteristics of respondents**

As presented in Table 2 presents majority (17) of the respondents were between the age 25-29 years. Three of the respondents who were also less than 25 years were single (never married). The rest were married. With respect to their academic levels, majority (16) were in the third year while seven, four and one were in the second year, final year and first year respectively. About their occupation, fifteen of the respondents were professional teachers out of which four were on study-leave with regular monthly salary.

More than half (15) of the spouses of the respondents were teachers while the rest were engaged in other self-employed economic activities with few (4) travelled overseas. Three of the spouses were students of other universities in the country. The ages of the babies/children of the student-mothers were between two months and six years. It was realized that six of the respondents had two or more children on campus that they took care of. Children who were more than a year old usually attended pre-school in and around the campus. Generally, some of the student-mothers employed paid or unpaid female baby-assistants. These assistants comprised relatives and non-relatives made up of teenagers, adults or the aged. The relatives were usually not paid.

**Intention to give birth**

Generally, respondents did not want to give birth while schooling owing to perceived challenges associated with pregnancy and child-rearing. Some of the married students recounted that their pregnancies resulted due to failure of the
natural method of contraception (calendar method and withdrawal) that they practised. Some were also pregnant before they got admission to the University and gave birth on campus. A few others brought their babies to campus after gaining admission to pursue undergraduate programmes.

Actually, I did not plan for the child. It was an ‘accident’. We (my husband and I) were using the withdrawal method and it failed. I was eight months pregnant when I got admission. I delivered at home. The baby was a month-old when I brought him to campus. He is now two months old. [A third-year married student-mother, 28 years]

TABLE 2.

Background characteristics of respondents

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-24</td>
<td>8</td>
<td>28.6</td>
</tr>
<tr>
<td>25-29</td>
<td>12</td>
<td>42.9</td>
</tr>
<tr>
<td>30-34</td>
<td>6</td>
<td>21.4</td>
</tr>
<tr>
<td>35-39</td>
<td>2</td>
<td>7.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>28</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital status</th>
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<tbody>
<tr>
<td>Married</td>
<td>25</td>
<td>89.3</td>
</tr>
<tr>
<td>Single</td>
<td>3</td>
<td>10.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>28</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupation</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching</td>
<td>15</td>
<td>53.6</td>
</tr>
<tr>
<td>Unemployed</td>
<td>13</td>
<td>46.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>28</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Academic level</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1st Year</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>2nd Year</td>
<td>7</td>
<td>25.0</td>
</tr>
<tr>
<td>3rd Year</td>
<td>16</td>
<td>57.1</td>
</tr>
<tr>
<td>4th or Final Year</td>
<td>4</td>
<td>14.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>28</td>
<td>100.0</td>
</tr>
</tbody>
</table>

There were few others who, although planned their births, did so because their husbands insisted. The fear of losing their husbands to other women compelled such respondents to give in to the insistence of the spouses. Notwithstanding, some of the married respondents expressed that they intended to give birth before completing their undergraduate programmes. Considering their age and marital status, they opined it was appropriate.

*I planned to have a baby while in school. I got married two years ago and I believe I am matured enough to bear a child. Even though there are challenges associated with child-rearing, I prepared myself physically, psychologically and socially.* [A final-year married student-mother, 30 years]

All the single student-mothers got pregnant on campus, with two delivering the babies at the University hospital and one in a hospital at home. While two used the calendar method to prevent pregnancy (which failed), the other, who was a teenager did not use any form of contraception with no reason even though she knew that unprotected sexual intercourse can result into pregnancy. None of them however, preferred abortion as a choice because of their religious beliefs.

*Child-rearing practices*
Respondents adopted various methods to care for their children. These include child-feeding practices as well as other structures put in place to support the rearing of children. The practices adopted were influenced by time schedules and duration of academic activities as well as availability of human and logistic supports.

*Child-feeding practices*
According to current biomedical recommendation, mothers are advised to exclusively breastfeed their babies for six months, after which other food supplements and water may be introduced. Given the academic activities on campus, it was realized that respondents rarely breastfed consistently beyond three months. This duration for exclusive breastfeeding is consistent with the 2008 survey findings of Ghana Demographic and Health Survey (Ghana Health Service et al, 2009). Even though there are no policies regarding student-motherhood and/or periods student-mothers are permitted to breastfeed their younger ones, they (student-mothers) would not be restricted from briefly absenting themselves to breastfeed their babies.

Two methods of breastfeeding were also adopted. The first method is feeding the baby with breast milk from the feeding bottle. Respondents extracted breast milk into feeding bottle(s) to enable their
baby-assistants to feed the babies on demand. The second method is feeding the baby directly from the breast. With this method, baby-assistants need to be closer to the student-mothers. Some of the baby-assistants positioned themselves at car parks and near the lecture halls (Photo 2). Based on a regular interval period, respondents attended to their babies to breastfeed.

Supplementary feeding was also common. Baby-foods such as Nan 1 (Nan 1 is a premium starter infant formula manufactured by Nestlé) was commonly used by the respondents because it is relatively nutritious and affordable. Other baby foods used include lactogen and SMA with the former more economical and the latter relatively expensive. Some of the respondents introduced supplementary foods and water to their babies after one month or sometime earlier contrary to the medical recommendation of six months of exclusive breastfeeding. Time constraint due to academic activities was the main factor that influenced early introduction of supplementary foods and water to babies.

Care-giving activities
Taking care of a child on campus as a student-mother was unanimously regarded by the respondents as an enormous challenge. They indicated that bathing, feeding, cuddling and putting a baby to sleep are challenging activities when one combines it with academic work. To be able to perform all these tasks in addition to their academic activities effectively, the student-mothers usually employed baby-assistants. As discussed in the subsequent subsections, they used mobile phones and

Use of baby-assistants
Baby-assistants comprised female relatives and non-relatives such as mothers and mothers-in-law as well as house-helps. In most cases, the non-relative baby-assistants were paid a minimum of GH 20.00 ($13.00) and a maximum of GH 40.00 ($27.00) per month. One factor that influenced the amount to be paid was the age of the baby-assistant. That is, the older assistants received higher allowance compared to the teenage baby-assistants. The reason was that the older baby-assistants are more likely to have some level of experience in child care-giving.

There were other non-relatives who offered help to some of the respondents without any remuneration. One of such assistants was the landlady of a second-year student-mother with a two-month old baby. The respondent could not afford to hire a baby-assistant due to financial constraints; fortunately, her landlady assumed the role as a baby-assistant without any fee.

I cannot afford to hire a baby-assistant and my mother has other children to take care of at home. My landlady assists me to take care of my baby. She is an experienced mother. Anytime I go for lectures she takes care of my baby. She advises me on how to take good care of the child. She assists me free of charge. It would have been difficult for me without her. [A second-year single student-mother, 20 years]
PHOTO 1.

_Some baby-assistants on the corridors that lead to lecture halls at University of Cape Coast_

![Photo 1](image1.jpg)


PHOTO 2.

_A baby-assistant talking on a mobile phone at University of Cape Coast Campus_

![Photo 2](image2.jpg)
Use of mobile phones

The use of mobile phones was held to be essential in child-rearing among student-mothers on UCC campus. Most of the baby-assistants had mobile phones to communicate with the student-mothers whenever the babies needed a special attention (Photo 2). Those who could not afford to buy an additional mobile phone for the baby-assistants made arrangements with co-tenants to avail theirs to baby-assistants to communicate with whenever the need arose.

Challenges associated with child-rearing on campus

Undoubtedly, child-rearing by student-mothers on campus comes with challenges. These differed from one respondent to the other. The challenges have been categorised into biophysical, psychological and socioeconomic challenges (see model), which have to potential to impact negatively on academic work of the student-mothers.

Biological/physiological issues

Some of the respondents talked about the complications they went through before, during and after labour. For instance, those who went through caesarean delivery found it difficult to engage in certain domestic and academic activities for longer durations. These impacted on their physical presence at lectures and group discussions regularly. There were others too, who could not extract adequate milk from the breast for biological reasons. Thus, they had to skip some hours of lectures to breastfeed, or rely on supplementary foods thereby preventing them from practicing exclusive breastfeeding.

Psychological and emotional issues

Psychological effects associated with child-rearing mostly emanated from stigma-related comments, doubts and poor grades. Certain comments from some lecturers and student became a source of worry to some of the student-mothers. For instance, one of the respondents recounted an experience
where a lecturer passed this comment: ‘…why did you in the first place get pregnant? The University is a place for students, not mothers’. This comment was made when the lecturer realized that the student-mother was consistently late to his 6:30 am lecture.

Another psychological challenge related to doubts about the ability of some of the (teenage) baby-assistants to take good care of the babies. Recruitment of baby-assistants was largely based on recommendations by relatives, other student-mothers and residents in the communities in which the respondents live. In many instances, the student-mothers did not have adequate or prior information about the background of their baby-assistants. Again, the teenage baby-assistant had inadequate knowledge about how to care for babies. These increased the doubts in the minds of the respondents who relied on such baby-assistants.

I always have the thoughts of the safety of my baby in my mind anytime I leave him. At lectures, my concentration is always half lost because of such thoughts. I hardly complete a full two-hour lecture. I always leave before closing. I doubt if my baby is in the safe hands. [A third-year married student-mother, 33 years]

Leaving my babies behind in the care of my teenage baby-assistant is not easy for me. At times I shed tears leaving my children behind. ‘How could she carry these ‘tiny’ twins if both are crying?’ I always think about them whenever I am away. Moreover, I don’t even know whether she is a good or bad person. [A second-year married student-mother, 31 years]

The most mentioned source of psychologically and emotionally disturbances and stress was whenever a baby fell ill. All the respondents said that the fear of losing a baby due to illness was so pronounced that they always stayed with them all the time until they got well. Thus, attendance to lectures and group discussions to a large extent was determined by the health of the babies of the respondents.

The issue about whether the babies of student-mothers in a way constituted a form of an obstacle were also discussed. Few of the respondents perceived that to some extent, their babies became obstacles to some aspects of their lives on campus. For instance, one of them had this perception when she suffered an ejection from her rented apartment by her landlord due to consistent cry of her baby. ‘The ejection made me feel that my child is an obstacle to me on campus. I decided to stop schooling but friends advised me not to’, said a 29-year old married student-mother. According to the respondent, the baby’s consistent cry at night was a nuisance to the other tenants. Another respondent had this to say:

I cannot go out to converse with my friends. I cannot join them to socialize during hall weeks and other social activities because of these children. I cannot leave them. At times, I see them as obstacles to my student life on campus. [A third year married student-mother, 33 years]
Social issues
Apart from attendance to church services, respondents did not involve themselves in organized social activities on campus. They however conversed with friends around and those who visited. They preferred to stay indoors to take care of their babies. Some of the student-mothers were of the view that their babies (and children) were obstacles to their social lives as students on campus.

Economic issues
Child-rearing also comes with an economic cost. Expenditure on diapers, food supplements, baby-attendants, accommodation (Table 3) and sometimes medicines (for the mother and the child) increase the cost of living for student-mothers. An expenditure estimation with the student-mothers revealed that on the average, a student-mother may incur a minimum of GH 192.00 (US$148) as an additional recurrent cost per month for caring for a baby less than six months old on campus. Obviously, student-mothers with twin –babies are likely to incur additional costs.

Apart from these costs, there were others that were incurred by respondents as a result of University’s policy specifically on accommodation. That is, a student-mother cannot stay in the hall of residence. Therefore, all the student-mothers needed to look for alternative (private) places of residence which usually have higher fees comparatively. Again, all the student-mothers who came to campus with their babies paid accommodation fees (which is a component of the admission fees) but never got accommodated. Thus, they were compelled to look for residence elsewhere at an additional cost since the University does not refund accommodation fees already paid. It must be indicated that student-mothers usually went for ‘descent’ accommodation suitable to the baby in particular, and also the baby-sitter.

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Monthly cost: Gh (US$)</th>
<th>Academic year (8 months) cost Gh (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation</td>
<td>75 (50)</td>
<td>600 (400)</td>
</tr>
<tr>
<td>Diapers</td>
<td>90 (70)</td>
<td>720 (480)</td>
</tr>
<tr>
<td>Food supplements</td>
<td>7 (5)</td>
<td>60 (40)</td>
</tr>
<tr>
<td>Baby-sitter</td>
<td>30 (20)</td>
<td>240 (160)</td>
</tr>
<tr>
<td>Airtime</td>
<td>25 (16)</td>
<td>200 (133)</td>
</tr>
<tr>
<td>Total</td>
<td>242 (198)</td>
<td>1820 (1213)</td>
</tr>
</tbody>
</table>
Impact of challenges on academic work

As discussed earlier, the challenges the student-mothers faced affected regular attendance to lectures, tutorials and group discussions. Some of the respondents compared their previous and current grades before and after child-birth and concluded that child-rearing have contributed immensely to their poor grades (Mortimore, 1996).

My child does not allow me to study at all. Sometimes when I have a quiz (class test) she will cry all night preventing me from studying. Last semester for example, I had grade D (50% - 54%) in almost all my courses; my worse academic results on campus. [A final-year married student-mother, 29 years]

Nevertheless, there were others who indicated that although the challenges they faced had affected their academic activities, there were no or insignificant effect on their academic results. It could therefore be argued that apart from the challenges, there are other factors that could be responsible for poor grades of some of the respondents that need to be explored further.

Coping strategies adopted

Respondents’ coping strategies were generally emotion-based. Withdrawal and weeping were the main coping remedies. For instance, one of the respondents indicated that ‘I bear my difficulties alone in my room at times with tears’. While some kept the challenges they faced to themselves, others were comforted by some of their friends who were privy to their predicaments. It is worth emphasizing that none of the respondents with such difficulties sought assistance from the Counselling Centre of the University. This was basically due to ignorance of the existence of the Unit and the services it provides. Some of the respondents gave reasons for not accessing any of the services rendered at the Counselling Centre.

I did not visit the Counselling Centre for advice on how to cope with the challenges I face. I have heard about the Unit but I don’t know its location. I also don’t know the services they provide there. [A final-year married student-mother, 30 years]

I have not heard about the Counselling Centre on campus and what they even do. Naturally I don’t go out so I don’t know what happens outside my home and my baby. [A second-year married student-mother, 27 years]
few however, adopted problem-focused coping strategies. They arranged to have group discussions in their rooms. Others contacted some of their lecturers and peers for lecture notes and explanation to issues in the notes which they could not understand on their own. The respondents were however quick to indicate that the academic benefits one derives from any or all of the above arrangements do not match those derived from attending lectures.

Sources of support
The study identified three main types support that the respondents relied on at campus. These are categorised into medical, social, economic (or material) and academic supports. Medical support was regular and almost free or very affordable. As a result of the free maternal health care intervention by the government, students-mothers found it easily accessible to seek medical health care from public health facilities. The proximity of the UCC hospital and PPAG clinic encouraged the student-mothers to attend post-natal clinics. At the UCC hospital, priority is given to student-mothers on specific days and times to enable them access services without undue delays at the hospital.

Social support included caring for babies, attending to various household activities, access to recreational facilities and relations. Some of the respondents were supported by the mothers, mother-in-laws and other hired and non-hired adults to support them in taking care of their babies. Other social supports such as encouragements came mainly from friends and spouses of the respondents.

Traditionally, economic support comes from the entire family to support the upkeep of a new-born baby at least during the first year of its life. During the naming ceremony of the child, gifts, both in cash and kind are presented to the parents to welcome the baby with. Such supports are usually provided to mothers who have legitimate spouses. Some of the respondents received this type of support at home during the naming ceremony of their babies. Nonetheless, the onus of (economic) responsibility rests on the father of the baby. It was therefore realized that spouses of the respondents constituted the main source of economic support. Other sources included monthly salaries (for those on study-leave with regular monthly salary), friends and other relations.

With respect to academic support, friends, peers and lecturers were the sources. Friends were however the major source of academic support. They provided respondents with lecture notes and other academic materials to be photocopied and some agreed to hold group discussions at the premises of respondents enable them (student-mothers in the group) to participate.
Discussion

Female education is crucial for human and national development. In Ghana, there is the popular adage made by a revered educationist and statesman, known as Dr. James Kwesi Aggrey (1875-1927) that ‘if you educate a man, you educate an individual, but if you educate a woman, you educate a nation’. Consistently, the Ghana Demographic and Health Surveys, as well as other related research, indicates that a woman’s education is very important when discussing and promoting improved standard of living and healthy nation. Ghana’s effort in this direction is therefore laudable as it also contributes to the achievement of the most of the MDGs.

As enshrined in the Reproductive Health Rights, the right to give or not to give birth is as crucial as female education. Thus, while promoting female education to the highest level, it also becomes imperative for reproductive rights to be promoted given the demographic dynamics of female students at tertiary institutions in Ghana. Hence, with no specific policy guideline or statement on issues about reproductive rights and student-motherhood at UCC for example, promoting the welfare and addressing the challenges student-mothers (and their children) face on campus become and remain a silent dilemma.

Irrespective of their intention to have babies while schooling, student-mothers face challenges that affect their welfare. With reference to the framework used for this study, student-mothers perform most if not all the seven roles on campus in addition to an eight role; academic. Performing all these roles within a ‘strict’ academic system does not only compound the challenges they face, but subsequently impact on the results from these roles especially the academic roles. The effects of these challenges reflect in the total wellbeing of student-mothers because they relate to all the factors (biological, psychological, social and economic) that touch on human health and welfare.

Addressing the challenges of student-mothers is therefore an essential one in that it could ease part, if not all the challenges they face. A policy direction is therefore necessary to create a platform for in-depth analysis and the establishment of institutional structures to address the situation of student-mothers, their children and (teenage) baby-assistants on campus. Apart from the University, other social entities must integrate issues of student-mothers in their broad framework or agenda.

However, in the absence of these interventions, female students must exercise their reproductive rights appropriately. The advocacy for safer-sex practices by the University must guide sexual activities of (female) students especially those who do not intend to have babies while on campus. The use of modern contraceptives is proven to be more effective compared to that of natural methods.

Proverbially, ‘a problem exposed is a problem solved’. This makes the Counselling Centre of the University relevant to students in general, and student-mothers in particular. With
trained staff in counselling, the Centre must be the preferred option for guidance and counselling to student-mothers irrespective of pieces of advice from friends and spouses. The Centre might need to revise its approach to service provision in order to reach to students with challenges rather than the challenged students visiting voluntarily for services.

Possibly, other support systems such as financial interventions with very minimal or no interest rates tailored to support childcare and associated costs will not only be relevant but also imperative. Such formal interventions do not exist in any of the financial and social organisations on the University campuses. While the University can consider this option, the Students’ Representative Council (SRC) (the mouthpiece of all students) can impress upon the University to reflect on this intervention. In fact, the SRC can draw out proposals to financial organisations or develop such a support scheme in corroboration with the University. Such an intervention could be broad-based to incorporate ‘special’ accommodation support (i.e. finding and negotiating suitable accommodation) for student-mothers. This can materialize if the debate or discussions on the topic gain public platforms at the University.

Conclusion

Undoubtedly, higher education of females is crucial to Ghana’s development particularly on meeting the MDGs. As such, governmental and institutional efforts over the years have been commendable. Nonetheless, child rearing becomes a critical issue that challenges many a student-mother at University of Cape Coast campus, and perhaps other institutions of higher learning. Although, this issue has not gained much attention, its discussion is relevant and timely to complement the various interventions that have been implemented to make University education more accessible to females.

Institutional structures existing such as the Counselling Centre, SRC, and other student-related organisations including the religious ones need to (re)consider the issue at hand with alacrity. Much discussion must go on among students, lecturers and management. This is essential to the development of appropriate institutional framework or policy and support scheme to meet challenges student-mothers face.

Recommendations

The study makes the following recommendations:

- The Counselling Centre of the University must develop steps to reach out to student-mothers to intensify the education on safer-sex practices, best motherhood practices and problem-focused coping strategies.
- The University must develop a policy on child bearing, student-motherhood and child-rearing practices on campus. This is essential to guide the academic relationship between staff (lecturers) and students, and also the reproductive behaviours of students.
- Accommodation fees must be decoupled from the admission fees that first year students pay. Choice of accommodation must
be optional to all students including first year students. This does not only promote the student’s rights to choice but also reduces the financial stress imposed on first year student-mothers.

- The SRC with the University can (liaise with some financial or NGOs) to develop financial support scheme for childcare and associated costs on campus for student-mothers.
- Further research should focus on the welfare of children of student-mothers and baby-assistants on campus.

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Child-rearing among student-mothers in Ghana


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Abstract

In sub-Saharan Africa, rural exodus leads to increasing unemployment in urban centres and to the disorganisation of farming practice in rural areas. This article draws on data from participant observation and interviews to analyse how rural exodus, combined with a population density that was already low, led to what we refer to as rural emptiness in Gabon, and how this affects farmers’ livelihoods. Farming in Gabon is largely slash and burn agriculture with a gender division of labour and therefore requires both men and women. Farming practices at our study site, in Loango National Park, follow a traditional pattern, but the labour force has been reshaped by demographic and social change. The exodus of young people, especially men, has left ageing farmers with increased workloads but decreased access to labour. Subsistence farming is, therefore, in a state of crisis and farmers’ livelihoods are threatened. Promoting the development of farming and rendering rural life more appealing through the development of roads and other infrastructure could reverse current trends of high unemployment, weakened agricultural production and high dependence on imported food in Gabon.

Introduction

Rural exodus, or outmigration, has been of particular interest in migration and development studies in sub-Saharan Africa, largely because of its influence on uncontrolled urbanization and increased rates of urban unemployment (Beauchemin & Bocquier 2003; Bryceson 1999, 2002; Mabogunje 1989; Tacoli 2002; Todaro 1971, 1997). The literature reveals that movement to urban centres in Africa is opportunistic, is used to diversify livelihood strategies within the extended family and can be temporary (Beauchemin & Bocquier 2003; Bryceson 2002; Byerlee 1974; Potts 2009; Tacoli 2002). Movement to urban centres can alleviate poverty and
decrease mortality for migrants through better access to amenities and health care, and higher incomes compared to these of rural areas (Beauchemin & Bocquier 2003; Wunder 2003; Pourtier 1989b). However, the consequences of rural exodus can vary greatly among regions and among countries. For example, rural population densities remain large in West Africa despite rural exodus (Beauchemin & Bocquier 2003), but the exodus has contributed to decreasing rural densities in Central Africa (Sautter 1966; Coquery-Vidrovitch 1972; Pourtier 1989a), creating what we refer to here as ‘rural emptiness’. In Central Africa, rural exodus has induced a loss of labour in rural areas, the ageing and impoverishment of farming communities and the disintegration of traditional farming practices (Sautter 1966; Coquery-Vidrovitch 1972; Pourtier 1989a). Rural exodus, hence, has the potential to weaken agricultural production, sometimes even resulting in famine (Pourtier 1989a; Beauchemin & Bocquier 2003; Wunder 2003).

In this study we investigate the factors contributing to low agricultural production in Gabon, which is located in the Central African region, with a focus on whether and how demographic trends of rural emptiness affect farmer livelihoods today. We begin by introducing the historical context of demographic trends in Central Africa, then present the state of knowledge of demography and farming in Gabon. Having set the scene, we present our methods and describe the socio-economic characteristics of the population and current farming practices at our study site. Then, we present the patterns of rural emptiness at the study site before analysing how rural emptiness affects farmers’ productivity and livelihoods. We end with conclusions and recommendations.

The Historical Demographic Context of the Central African region

Several authors have remarked on the low population density in Central Africa, offering a suite of biological explanations (refs). Headrick (1990) suggested that the low population densities and fertility in Central Africa may be due to the prevalence of endemic diseases (e.g., sleeping sickness and malaria, which may increase the rate of miscarriage), poor diet, and unbalanced sex ratios. These vulnerabilities have been exacerbated by colonial and post-colonial spread of venereal and other diseases (Sautter 1966; Headrick 1990; Coquery-Vidrovitch 1972; Adams & McShane 1996). Additionally, Sautter (1966) suggests that the dense forest habitat that characterizes Central Africa does not favour in-migration and sustainable social relationships between groups, thus limiting rapid population growth by constraining the number of potential partners thus leading to increased consanguinity and decreased fertility.

Contemporary low human densities, especially in rural areas, are also the result of historical forced displacement imposed on people in Central Africa countries since the 1700s. For example, Oslisly et al. (2013) suggest that the prolonged slave trade affected demographic patterns as well as ecosystems in the region. In Gabon, possibly as many as 18,000 individuals were lost to slavery each year in the second half of the 17th century (Gauthier 1950 cited in Bouet 1978), further depleting areas that already had
low population densities (Sautter 1966; Coquery-Vidrovitch 1972; Pourtier 1989a). Later, the French colonial administration’s active regroupement scheme involved relocating villages alongside roads and other transport routes (e.g., rivers) in its colonies, emptying forests of human settlements (Pourtier 1989a). The regroupement policy was ostensibly aimed at providing populations with access to education and healthcare but also served as an instrument of control and facilitated the collection of taxes (Sautter 1966; Coquery-Vidrovitch 1972; Pourtier 1989a). Forced labour for concessionary companies or large infrastructure projects (e.g., railroad construction) concentrated elements of the labour force, particularly young men, in some areas, depleting other areas of their labour force (Coquery-Vidrovitch 1972; Pourtier 1989a; Adams & McShane 1996; Wunder 2003). Companies eventually realised that women farmers could produce a cheap source of food for their employees and started to accommodate entire families, sometimes creating schools and supporting farming on-site, concentrating populations even further (Coquery-Vidrovitch 1972; Pourtier 1989b). When displacement was not directly forced on people, they also moved away from their home villages to avoid forced labour, forced resettlement and taxation by the colonial state (e.g., Equatorial French Africa now Gabon, Republic of Congo, Central African Republic and Tchad : Coquery-Vidrovitch 1972).

Starting in the late 19th century, rural exodus developed with the search for wage-earning activities in the proto-capitalist economy that was emerging more generally in sub-Saharan Africa (Bryson 1981; Mabogunje, 1989). The low-income return of subsistence agriculture, combined with high differences in incomes between rural and urban areas, led subsistence farmers to seek alternative livelihoods in cities (Mabogunje 1989; Pourtier 1989; Smit 1998; Tacoli 2002). After some exposure to urban lifestyles, rural exodus is exacerbated by rural dwellers’ desire to increase their quality of life and benefit from infrastructure such as schools, electricity and healthcare, which is present in urban centres but absent from isolated villages (Pourtier 1989b). The United Nations estimated that the annual global population growth rate in Gabon was 1.9% in 2011 while the rural population growth rate was -0.4%, which suggests that rural exodus was still occurring then (United Nation data 2011).

Demography and farming in Gabon

Populations appear to have always been low in Gabon. Archaeological records suggest that population densities were as low as 0.5 inhabitants per km2 prior to colonisation by France (Clist 1995 referring to the Iron Age and cited in Wunder 2003). More recently, the population density was 1.68 inhabitants per km2 in 1961 (Sautter 1966), and 5.7 inhabitants per km2 in 2011 (United Nations data 2011). Although larger than in the 1960s, this latter value is still low in comparison to other countries in the region (Republic of Congo: 12.4 inhabitants per km2; Democratic Republic of Congo: 28.2 inhabitants per km2; Equatorial Guinea: 25.5 inhabitants per km2 and Cameroun: 44.8 inhabitants per km2– World Bank data 2011). In addition, only 13.5% of the total...
population of Gabon lived in rural areas in 2011, with rural population densities sometimes as low as 0.2 inhabitants per km² (Wunder 2003; Laurance et al. 2006; United Nation data 2011).

Several authors suggest that the low human density is a cause of low food production in Gabon (e.g. Pourtier 1989a; Wunder 2003). Agriculture currently represents 3.9% of the GDP and cultivated land represent less than 2% of the country’s surface area (World Bank Data 2011 and 2012). The importance of subsistence agriculture for rural populations in Gabon is unclear. Archaeological evidence suggests that slash and burn agriculture developed as early as 3500 – 2000 YBP in Gabon (Oslisly et al. 2013), suggesting that agriculture has long been a part of livelihood strategies. Metegue N’Nah (1979) mentioned that agriculture was the main activity providing non-protein food items in the pre-colonial era, and that gathering was used to supplement the diet, in addition to fishing or hunting. Gaulme (1981) considered that agriculture was the second most important resource for subsistence after forestry in Fernand Vaz, which is located on the coast of Gabon. In the specific case of coastal populations, it is argued that early contact with Europeans transformed local societies deeply and that people shifted their focus from manual labour and agricultural production to trade (Merlet 1990; Pourtier 1989a; Magnagna Nguema 2005). Wunder (2003, p 6), however, argues that all Gabonese farmers should be considered as “forest people practising complementary subsistence cropping”, suggesting a more important role for hunting and gathering than for agriculture. In both cases, food production remains low in part because of low rural densities (Pourtier 1989a; Wunder 2003). For this reason Pourtier (1989a) considered that agriculture in Gabon was in a “state of crisis”.

To make matters worse, the Gabonese government provided very limited support for the development of agriculture until the mid-1980s, focusing instead on high return industries like forestry, oil exploitation and mining (Bouet 1984; Magnagna Nguema 2005). As a consequence, while the country was mostly self-sufficient until it gained independence in 1960, as much as 80% of food items are now imported (Wunder 2003; FAO/CEEAC 2011). An FAO report cited by Tébéka (2012) estimates that Gabon spends close to 220 million euros annually to import fruit and vegetables from Cameroon, Ivory Coast, South Africa and the European Union (Tékéba 2012). Achieving food self-sufficiency is now a priority in the Gabonese government agenda (Tékéba 2012; Le Gabon 2013) and our study aims to contribute to this effort by providing insights into the processes currently affecting farmer’s productivity and livelihood in Loango.

Study site and data collection

We collected data for this study as part of a study of the relationship between biodiversity conservation and farmers’ livelihoods in the northern sector of Loango National Park (Loango NP Fig 1 and Fig 2.) from October 2009 to November 2010. We selected this region of Gabon as it is known to suffer a high level of conflict between wildlife and farmers (Lahm 1996). The regroupements included in the study are Ntchongorové, Idjembo, Ntchonimbani, Iloupi, Bonneterre, Obiro and Yombé (Fig 2). Together, Ntchonimbani, Iloupi,
Bonneterre, Obiro and Yombé are commonly referred to as “la Haute” (the upper lagoon), and we use this terminology throughout.

The population of Loango is composed of two major ethnic and linguistic groups: the Pounou (or Bapounou) and the Myéné (Blaney et al. 1999). While the Ngowé (also called Ngubi, and a segment of the Pounou group) seem to predominate, a large number of Nkomi people are present at the study site. Almost all people speak Nkomi (belonging to the Myéné language group) in addition to their natal language. The minority ethnicities present are Eshira, Loumbou (or Baloumbou), Bavarama and Vili of the Bapounou group, Bakota of the Batéké group, Nzebi, Benga, Fang, Akéle, Tsogo and Aduma (Blaney et al. 1999; ANPN 2009).

We combined participant observation with semi-structured group interviews due to the difficulty of interviewing farmers individually (Emerson, Fretz, and Shaw 1995; Bernard 2005; Drury, Homewood, and Randall 2011). We selected farmers for interviews using stratified random sampling based on the location of their fields due to the need to survey crop-raiding incidents. We conducted 37 interviews with full-time farming families (Table 1). E.F. and K.R. lived in Ntchongorové and Idjembo for the duration of the study, resulting in first-hand experience of the difficulties that confront villagers living in remote areas of Gabon (e.g., poor transport infrastructure and lack of electricity and running water). This also allowed us to witness how rural emptiness affected peoples’ daily routines. We also mapped farmers’ fields with a GPS and calculated field size for each farmer using ArcGis 9.

<table>
<thead>
<tr>
<th>Regroupement</th>
<th>Number of interviews</th>
<th>% of farming families interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ntchongorové</td>
<td>11</td>
<td>31</td>
</tr>
<tr>
<td>Idjembo</td>
<td>10</td>
<td>58</td>
</tr>
<tr>
<td>Ntchonimbani</td>
<td>5</td>
<td>83</td>
</tr>
<tr>
<td>Iloupi</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Bonneterre, Yombé, Obiro</td>
<td>10</td>
<td>91</td>
</tr>
</tbody>
</table>
FIGURE 1.

Map of Africa with Gabon in red, and a map of Gabon with National Parks in green. Loango National Park is framed in blue and red dots are the major cities of interest for this study. Map created based on data from the World Resources Institute.
FIGURE 2.

Northern part of Loango National Park, including the study site which included all regroupements except Mpivié. Based on data provided by the Wildlife Conservation Society and observations in the field.
Livelihood strategies and farming practices in Loango

As described earlier, Loango has long been under western influence which is believed to have shifted livelihood strategies from extraction and production of resources to trade with westerners (Metegue N’Nah 1979). Coastal people are known for acting as brokers between Europeans and groups from the interior during the slave-trade and also for trading ivory, wood and other forest products (Coquery-Vidrovitch 1972; Gaulme 1981; Pourtier 1989a). Since then, as in Gabon more generally, oil exploitation and forestry have provided a large source of income, keeping people away from subsistence activities (Pourtier 1989a; Wunder 2003).

Farmers in our study based their livelihood strategies on a portfolio of activities based around a gender division of labour. Sources of income included fishing, hunting, gathering, farming, traditional medicine, handicraft production and any wage labour activities available. Our data reveals that that 95 % of households in the park and Iloupi, 100 % in Idjembo and Ntchonimbani, and 35 % in Ntchongorové depend mostly on subsistence activities including farming. All households practising fishing, palm wine production, traditional medicine and handicraft production also farm. Women practise farming, traditional medicine, handicraft production and domestic activities, while men provide sources of protein through fishing and hunting or provide cash through wage labour. Sources of wage labour in the area include tourism, conservation and research, oil exploitation, forestry, telecommunications, state employment for education, health and wildlife management, and operating transport, shops and bars. Other sources of income include remittances from relatives, pensions or the rental of properties. Households benefiting from wage labour engage in complementary subsistence or itinerant activities for food and/or as additional sources of income.

Farming or fishing was the primary source of income for 68 % of households in our study, although the proportion differed between villages (Table 2). Only 10 % of households reported farming as their sole source of income. Farmers never mentioned gathering as a livelihood strategy, and when gathering did occur it seemed to be limited to secondary food products such as crab, oysters, wild mango (odika), palm nuts (nyamboué) or raffia leaves for cooking manioc and in most cases these products were not sold but consumed within the household. People also mentioned collecting nuts (Coulæ edulis and Cola sp.) opportunistically when they were available near villages, although we never actually witnessed this. In general, gathering is practiced by women and is insufficient to provide food security or a substantial source of income in our study site. Households in la Haute relied more on fishing than farming while households in Ntchongorové relied more on other sources of income (Table 2). Information about money and income was often difficult to extract and, thus, we are aware that the information presented here is highly subject to
people’s willingness to share such information.

Despite the ethnic diversity present, all people in our study used the same agricultural methods during the study period. Farming is limited to crop production with no livestock rearing apart from a few chickens and, in two cases, a few goats. This lack of livestock production reflects a common trend throughout Gabon which may be the result of the predominance of hunting and gathering practices in the past and the historic prevalence of tsetse flies and trypanosomiasis, compounded by the inadequacy of transport and market systems which discourages investment in livestock farming (Magnagna Nguema 2005). Easy access to a productive fishery and the perceived threat of livestock depredation by pythons, leopards, and other wildlife exacerbate this trend in the specific case of Loango.

Contemporary farming in Loango has not advanced in the post-colonial era, as is the case more generally in Gabon (Pourtier 1989b; Wunder 2003), with most farmers still reliant on axes and machetes and virtually no mechanisation of labour. The shifting cultivation practice relies on a gender-based division of labour where men clear the forest to create new fields during the long dry season and women perform all other activities, from clearing brush and undergrowth, to planting, harvesting, selling and cooking produce (Pourtier 1989a; Leach 1992; Vansina 1990; Coomes et al. 2000). We only witnessed men engaging in all aspects of agriculture in Loango if they did not have a female partner or relative capable of farming.

Most farmers possess more than one field, including at least one from a previous year that still provides food (“old field”) and one cleared during the current year (“new field”). Fields are generally located less than 2 km from the village, but may be up to 8 km away. The mean field size at the study site is 5404 m²/woman/year (range 680 – 18,260 m²). Agricultural activities follow seasonal changes in rainfall where new fields are created during the long dry season (May-September).

Manioc (Manihot esculenta) is the predominant crop species and the most important for subsistence and income, though banana (Musa sp.), tarot (Colocasia esculenta) and sweet potato (Ipomoea batata) are important secondary crops. Other crops grown include pumpkin (Cucurbita sp.), aubergine (Solanum sp.), peanut (Arachis hypogaea), sugar cane (Saccharum officinarum), roselle (Hibiscus sabdariffa), chilli pepper (Capsicum frutescens), papaya (Carica papaya), pineapple (Ananas comosus), avocado (Persea americana), mango (Mangifera indica) and Citrus sp. (lemon, grapefruit, and orange). Manioc, banana and taro are grown over extended areas while the other crops are planted in small gardens around habitations. The root crops (manioc, potatoes and taro) are harvested as needed and can be left unharvested for extended periods (up to three years in the case of manioc). Bananas provide one bunch a year, which is harvested when ripe. Other, less important, food crop species are harvested when needed or ripe but, as they are not grown in large numbers or over extended areas, their harvest does not represent important activity for the farmers in the year.
TABLE 2.

Primary sources of income for interviewees in Loango

<table>
<thead>
<tr>
<th>Regroupement</th>
<th>Number of households</th>
<th>Farming</th>
<th>Fishing</th>
<th>Other (^1)</th>
<th>Traditional medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ntchongorové</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Idjembo</td>
<td>10</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ntchonimbani</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ilopi</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bonneterre, Yombe,</td>
<td>10</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>37</strong></td>
<td><strong>15</strong></td>
<td><strong>10</strong></td>
<td><strong>9</strong></td>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>

\(^1\) Includes wage labour, rental of properties, pensions and remittances from relatives

TABLE 3.

Monthly income of subsistence dwellers in Gabon

<table>
<thead>
<tr>
<th>Publication</th>
<th>Date of study</th>
<th>Origin of income</th>
<th>Monthly income (CFA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blaney et al. (1999)</td>
<td>1998</td>
<td>Farming</td>
<td>30,000</td>
</tr>
<tr>
<td>Walker (2012)</td>
<td>2010</td>
<td>Hunting, fishing, irregular jobs and small pensions</td>
<td>10,000-45,000</td>
</tr>
<tr>
<td>Gabonese Statistical General Direction</td>
<td>2005</td>
<td>Annual income of the 20 % poorest in West Gabon (including the region of the study)*</td>
<td>22,600</td>
</tr>
</tbody>
</table>

*According to the United Nations, the lowest incomes in Gabon are for rural dwellers, women and widows (United Nation data 2011)

Contemporary trends of rural emptiness in Loango

The current population density in Loango is low and the last data available provides a value of 0.2 inhabitants per
km² (Laurance et al. 2006). Records from the 1970s show that Idjembo, Ntchongorové and Yombé had about 580 inhabitants (Gaulme 1981) and Gaulme suggests that this value was low compared to earlier trends. Data collected in 1998 (Blaney et al. 1999) shows a population of 189 for these villages and of about 260 individual for the entire study site. Data from 2008-2010, including our data and ANPN (2009), shows a population of about 400 people for the entire study site. Population changes have differed between villages. For example the population in Ntchongorové has increased since 1998 (from 48 individuals to 254 including children) while the population has declined or remained stable everywhere else (e.g., from 102 to 52 in Idjembo, from 39 to 12 in Yombé and stable in Obiro and Ntchonimbani). Blaney et al. (1999) suggest that the historical presence of a school in Idjembo has helped to keep women and children in the area and we believe the creation of a school in Ntchongorové in 2008 had a similar effect. Employment in tourism in Ntchongorové and in oil and forestry companies has also slowed rural exodus at the regional level (Blaney et al. 1999). However, the population at the study site is now about a third smaller than it was in the 1970s.

The decline in population in Loango, which is partly due to rural exodus by young people, has resulted in a rapid increase of the average age of the remaining population (Blaney et al. 1999). Blaney et al. (1999) estimated that 33% of the population in the Etimboué department (of which Loango is a part), including children under 14 yrs, was over 55 yrs, with 50 – 100% of residents in many villages older than 55 years. Their data for the villages included in our study shows a value of 36.5% of people over 55 yrs. Data provided by ANPN (2009) for the regroupements included in our study show that people over 55 yrs represent 18.5% of the population if we include children under 14 yrs and 28.6% if we exclude them. Our census in la Haute, however, showed far fewer children and adults under 55 yrs than the data provided by ANPN. In our study, 49% of the subsistence farmers we interviewed (therefore excluding children) were over 50 yrs, with large differences in age structure between villages. Only 37.5% of farmers were over 50 yrs in la Haute, compared to 64% in Ntchongorové and 60% in Idjembo. It is possible that village composition changed between 2008, when ANPN collected data, and our study in 2010. It is also possible that seasonality has played a role in the differences between the two datasets as family members and pupils tend to visits their relatives in villages during the dry season and holidays which may alter demographics at those times. In contrast to the exodus of young people, retired people tend to return to their home village to engage in subsistence activities either to complement their pensions or as a full-time subsistence strategy if they do not receive a pension. Six of the 37 farmers in our study came back to the study site at retirement after spending their working years in the city. The concomitant exodus of young and influx of elders increases the average age of the rural population.

Rural emptiness is partly caused by a lack of interest in the rural lifestyle and rural subsistence activities, including farming. Our discussions with people
under 35 yrs in the various villages clearly highlight that the hard work associated with farming and the difficulties of life in rural areas encourage them to remain in urban centres, even when unemployed. Young people only endure life in rural areas if they have access to wage labour or have no other choice. One older informant explained this situation as follows:

*People today [meaning young people], they want to be in cities. They are everywhere but they don’t work. They see that there is no ambiance here [meaning other young people, bars and so on], so they don’t want to stay. They don’t like being in the village.*

When we asked what they would do if they lost their jobs most people under 35 yrs replied that they would return to the nearest city to look for a new job. When we interviewed two young women working in tourism and with limited education, and asked whether they would stay in their village to engage in farming when unemployed, one said:

*Oh Emilie, even when I go to see my mum, I refuse to work in the field. I don’t even like life here [in rural areas], it is too harsh. I am here because I have a job, if not, I can’t stay here.*

Life in rural areas is generally very demanding, especially for women and children, as they are often in charge of most of the domestic duties in addition to non-protein food production (e.g., water fetching, collection of firewood, laundry, cooking). Several studies have shown that sub-Saharan African women work 45 to >73 hours a week for food production and domestic labour alone (Laburthe-Tolra 1975 and Guyer 1977 cited in Bryson 1981). It is, therefore, likely that the high daily workload of women in rural areas makes a rural lifestyle unappealing to young women in comparison to life in cities, which decreases the burden of domestic duties through easy access to electricity and water, and access to wage labour opportunities. Both the young women questioned above lost their job at the study site in 2011, and both left for the nearest big city where they are still working today (May 2014).

Men seem to be more willing to remain in rural areas. We encountered eight men under 55 yrs (five were <35 yrs) who had lost their full-time job in tourism or conservation Idjembo and Nchnogorovë but remained in the area, at least temporarily, to engage in subsistence activities (e.g., fishing and palm wine production) or to benefit from temporary wage labour opportunities in oil industry. The high economic return of fishing and wage labour when compared to farming, in addition to the fact that men do not support the burden of domestic duties, makes life in rural areas more attractive to men and young men than to young women. The high proportion of people under the age of 50 yrs in la Haute, where there are no facilities, and where villages are very isolated, probably has a similar explanation. People in la Haute rely heavily on subsistence fishing, which is probably motivated by two factors: 1) a high level of crop-raiding, which discourages farming (see Fairet 2012 for details of crop-raiding), and 2) the high economic return from fishing which makes it a more attractive activity than ?.

In addition to an actual loss of people, rural exodus also fragments
villages (Sautter 1966). According to several authors, villages in Gabon were larger at the beginning of the century than they are now (Sautter 1966, Gaulme 1981; Blaney et al. 1999) and contemporary villages are often the result of village breakup following family disagreements. While family disagreements also occurred in the past, they were resolved more readily due to the need to stay grouped for safety reasons (Sautter 1966). Several elders in our study villages complained that young people no longer wish to remain in their natal villages due to family dissent and prefer to create a new village instead. Sometimes each sibling of the same nuclear family sometimes created a new village in Loango, fragmenting the family group. Their explanation was that remaining with their parents led to too many conflicts and that it was easier to be independent. In areas with limited transport infrastructure, such as Loango, such fragmentation has led to smaller, isolated villages that are scattered across the landscape. This situation is also reflected in the difference between Blaney et al.’s (1999) report of 3 villages and ANPN’s (2009) report of 10 villages in la Haute. As a consequence of this fragmentation, people are more scattered and, therefore, more isolated from each other even when they remain in the same area.

By contrast to the picture of systematic exodus from rural areas and subsistence based activities by young people, we also found that several long-term unemployed young people had returned to their home village and engaged in subsistence activities (mostly fishing, but also farming), sometimes on a long-term basis. This implies that subsistence activities in rural areas remain as a safety net or fallback strategy during times of duress, such as long-term unemployment, as shown more generally in Africa (e.g., Mabogunje 1989; Beauchemin & Bocquier 2003; Wunder 2003).

Consequences of rural emptiness for farmers

Agriculture has been deeply affected by rural emptiness in Loango (Gaulme 1981; Pourtier 1989b). The outmigration of young women has significant implications for farmers in terms of daily workload. Young female relatives, particularly daughters, previously provided substantial assistance to farmers in all activities from domestic duties to processing manioc (Bryson 1981; Fresco 1986; Vansina 1990; Cramb et al. 2009). This assistance allowed the farmers to spend more time in their field, as well as providing a buffer against heavy workloads, both in the house and in the field. With younger female relatives away at school, living in urban centres, earning a wage or simply unwilling to help, female farmers now face an onerous daily workload alone.

Agriculture has also suffered a direct loss of access to male labour, which is needed to clear fields. According to our informants, male relatives did this work in the past but this is not always the case now. One of our informants explained this as follows:

*As I am now, I have cleared this little garden that monkeys and cane rats have eaten. [...] Before, you didn’t need to pay people to clear your field [suggesting there were people to do it without providing cash] but now you need money and...*
The lack of access to men can be a simple consequence of the ageing of the population, especially in the farming community, leading to husbands who do not have the strength or the ability to clear fields for their wives or relatives. Nine of the 36 farmers included in the study (24%) had husbands who were too old or disabled to clear fields for their wives or relatives. Another five women were widowed or simply did not have a husband or partner to help them.

Traditionally, children of the family clear fields for their female relatives but this did not occur frequently in our study. Of the 14 women farmers who had no partner to help, seven (50%) had no sons present in the area who could clear their field for them. Another five (36%) had sons present in the area who were working for tourism or conservation full-time and did not clear their relatives’ field. The last two farmers had sons in the area and we do not know why the sons did not help them.

The direct consequence of the lack of male relatives available to help farmers is the need to find extra-familial sources of labour. One informant, whom we estimated to be more than 70 yrs, explained that she was obliged to work in other farmers’ fields to earn money to pay men to clear her own field because her husband was too old to do it himself and no other relatives were available to help without payment in cash. However, most farmers said that their working children tried to send money to help pay for labour to cut and clear fields. When we asked how one informant how she managed to have a field cleared she answered:

*If my children are available they come and do it [cut and clear the field]. If not they send money to hire somebody. This year there is no money so I am waiting to see whether my kids are going to come.*

Our interviews revealed that the cost of clearing a field of big trees averaged 20,000 - 50,000 francs CFA (equivalent to US$ 41 – 103) plus the provision of food and drink to the labourers. This is in line with Walker’s (2010) study on crop-raiding in Gabon in general, which gives an estimate of 52,000 CFA (about US$ 100) to clear an average field at our study site (9.7 CFA / m2 for an average field of 5,404 m2). The additional cost of hiring labour to clear the field from smaller shrubs and liana averages 30,000 CFA (US$ 60) based on our data and 60,000 CFA based on Walker’s (2010) estimations. In total, it would cost farmers 50,000 – 112,000 CFA to prepare a field for planting. We did not collect data on annual income but the literature allows us to estimate incomes for rural dwellers at 22,000 – 75,000 CFA per month (30,000 CFA from farming + 45,000 CFA from other sources maximum - Table 3). Thus, hiring labour to clear a field costs the equivalent of 1.5 – 5 month’s income for families relying primarily on farming as a source of income and about 0.7 – 1.5 month’s income for families relying on a portfolio of subsistence activities. The cost of hiring the labour necessary to farm requires a non-negligible and reliable source of income if relatives cannot help.
Farmers use two main options when they cannot afford external labour and cannot manage the extra labour required to clear new fields. First, they farm smaller fields, as also recorded by Pourtier (1989a) and Wunder (2003), and, consequently, experience lower production. Lower production adds to farmers’ risk of poverty because they cannot secure their income from farm produce and must purchase essentials that they might otherwise have produced. Subsistence agriculture in Gabon produces only 5 – 15% surplus, which farmers generally use as an additional source of income (Mengho 1978 and Wilkie and Sidle 1990, cited in Lahm 1993). If production falls, this will lead to a direct lack of food or lack of income.

The other possible solution is to replant on young fallows that do not yet have big trees and are easily cleared with a machete. Young fallows also tend to be closer to the village, reducing the need to travel long distances daily. Several of our informants over the age of 60 yrs explained that the associated waning strength and poor health associated with age and a lack of relatives to help resulted in smaller field sizes and/or use of young fallows. For example:

I have cleared a little garden here near my old garden [which was a place where she used to have a field only few years ago]. I wanted to clear a field in Mpembanyanjie [far from her home but where other farmers had cleared fields that year] but my children said I was too old to go far and that I should stay near the village. Also if I clear a large field, who is going to help me? I can’t. I have to make this little garden.

Fields created on younger fallows tend to have a higher incidence of weeds (Fresco 1986; Walker 2010), which increases labour requirements further. Most farmers at the study site complained about the intensity of weeding requirements but we never witnessed a farmer paying for extra-familial labour to weed their field. During the study, however, six farmers in Ntchongorové and Idjembo abandoned a portion of their field because they could not weed it properly.

In addition, young fallows may not necessarily have benefitted from good soil regeneration, suggesting that crop production will be lower for a similar workload (Fresco 1986; Cramb et al. 2009). Thus, farmers need to increase the field size to achieve similar levels of production to fields cleared from mature forest. Again, this lead to heavier workloads for planting and weeding, which may simply not be possible when relatives are already not available to help.

Another consequence of the lack of available male labour is a transfer of gender roles, increasing farmers’ workload even further. In Loango, a meal without protein is not considered a “proper” meal and is associated with the French word disette, which means famine and food scarcity, and is extended locally to mean poor nourishment due to the lack of protein. Men are generally expected to provide animal protein (e.g., fish or meat) in Loango, or the financial means to purchase it. Historically, women fished for oysters and crab or fished with a simple line, but they did not fish with a net (Gaulme 1981). During the course of this study, we rarely witnessed women fishing for oysters or crabs. Five women fished with a net in la Haute but they all
accompanied their husbands when they did so. In addition, two women in la Haute and two women in Ntchongorové were obliged to fish, in addition to farming and performing other domestic activities, because they had no men to fish for them. The other villagers recognized these women as “very strong women,” supporting the notion of a gender bias in fishing strategies. Women not capable of taking on the additional burden of fishing with a net by themselves risk reduced access to protein and a subsequent cascade of social and familial effects. Similar gender role transfer has been observed in other parts of Gabon (Metegue N’Nah 1979; Pourtier 1989b) and imposes significant time and financial constraints on women’s lives.

One important activity often overlooked in studies of labour constraints on subsistence farming is the need to protect fields against crop-raiding animals. At our study site, field protection, including fence building, trapping and night-guarding, is the duty of young people and men. Where these demographic groups are absent, women, elderly men and children have to protect their fields against raiders like elephants, but are often unable to do so. In addition to the increased workload for women, their reduced capacity to protect the fields adequately leads to increased crop loss (Lahm 1996; Fairet, 2012). The combined responsibilities of domestic duties, farming (including the protection of crops), and fishing are overwhelming in the absence of an available labour force, which ultimately creates a labour bottleneck and results in the farmers’ inability to secure sufficient food and income.

At the same time as food production becomes increasingly difficult, and often as a direct consequence of farmer’s inability to produce enough food to sell, the price of a manioc “packet” increased by 25% locally (from 4,000 to 5,000 CFA) between 2010 and 2012. Farmers blame this rise on the cost of labour. One informant expressed this as follows:

Food purchase is difficult now. See the price of the packet is 5,000 CFA now. Well when you need to take somebody to help you it makes the price increase of course.

EF still lives at the study site and manioc is increasingly difficult to purchase locally. She is now obliged, on occasion, to have manioc sent from Port-Gentil or Libreville (two large cities). The reason women at the study site provide for not selling manioc is the difficulty of farming and the high workload required. Manioc that is sold in villages for 5,000-6,000 CFA can be sold for 6,000-10,000 CFA in Port-Gentil. The higher price in cities is partly due to the added cost of transport from rural to urban centres but also to the high demand for food in urban centres. This difference in price leads some farmers to send their produce to the nearest city rather than selling it locally. The direct consequence is a further lower availability of food in villages and further price increases in both rural and urban areas.

Farmers also send food to their urban relatives on a regular basis, especially students and unemployed family members. However, the lack of access to labour means that they are now unable to produce enough food to do so. This represents the loss of a possible food safety net for urban dwellers, and especially students. Thus, while the lack of access to labour seems to affect
mostly rural dwellers, rural emptiness has also a negative influence on urban dwellers.

**Conclusion and recommendations**

Rural emptiness, combined with a lack of interest in farming by young people, have intensified the labour and income requirements placed on individual farmers in Loango. Ultimately, this perpetuates a negative feedback cycle whereby labour shortages inflate labour demands and costs, as previously suggested by Wunder (2003) for Gabon. This constrains farmer productivity, eliminating the surplus food necessary to render villagers resilient to food and economic insecurity. The most vulnerable citizens (elderly people, husbandless women and poorer households) are overrepresented in rural areas and are the most severely affected by these societal changes, partly due to their inability to mitigate crisis (United Nations 1995). In this context, the unreliable and limited labour force exacerbates the effects of any event that affects a farmer’s abilities to plant and harvest, and can lead to a subsistence crisis (Scott 1976). Subsistence farming practices remain traditional, while the labour force on which they were founded has been reshaped by demographic and social changes. The farming system in Loango is, therefore, still in a “state of crisis” – as observed by Pourtier (1989a) nearly 25 years ago.

Under its current sustainable development strategy, the Gabonese government aims to decrease dependency on extractive resources, such as petroleum and timber, and improve food production (Bouet 1984; Le Gabon 2013). The national implications of the failing farming system may be severe as Gabon strives to reach the national objective of food self-sufficiency. Without the combination of organized intensive/commercial and subsistence local agriculture, food prices will continue to rise in both rural and urban areas and reliance on imported, and often expensive, products will only amplify (Wunder 2003). Poorer households, many of whom rely on farming for subsistence, are already struggling to produce enough food or income, resulting in as much as 70 % of the Gabonese population feeling undernourished (Gallup Inc. 2012) and 33 % of the population and 44 % of the rural population living under the national poverty level (World Bank data 2011). Promoting and facilitating local food production and trade would not only reverse this issue, but would also help reduce Gabon’s high unemployment (United Nation data 2011), especially among young people, who might be more willing to engage in farming if it was more profitable, as suggested by the example of profitable fishing practices at our study site. Trends in Gabon, and other sub-Saharan African countries (Beauchemin 2002), suggest that re-ruralisation may be occurring, and even increasing, in some places (rural population growth in Gabon was 0.19 and 0.13 for 2011 and 2012, respectively, World Bank data 2012). EF recently encountered a young woman who had abandoned her wage job in Port-Gentil to return to her village to start farming as a direct result of the increase in the price of manioc to 10,000 CFA. This example is encouraging as it shows that young people may consider lives in rural
areas as an opportunity to prosper rather than simply to survive.

As proposed by others, developing rural facilities and infrastructures to improve living conditions, as well as developing reliable transportation routes to facilitate easy transfer of labour and products between rural and urban areas, could incentivize a reversal to rural exodus (Tacoli 2002; Todaro 1971, 1997). While industrial farming is undoubtedly on the government agenda (Le Gabon 2013), subsistence farming should not be neglected as a force keeping local and national price to reasonable levels as discussed by Baiphethi & Jacobs (2009). Improving and promoting local, small-scale food production in Gabon could therefore boost the nutritional and economic security of its populations.

Grants


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Aim and background

My research aims to understand the patient experience of bariatric surgery as an intervention for the treatment of adult obesity, focusing on the first two years after surgery. The UK rates of adult obesity (defined as a BMI of over 30 kg/m²) are currently estimated to be 25% with a projected trajectory of 60% of men and 50% of women by 2050. In the UK, bariatric surgery may be offered to patients who meet the eligibility criteria as outlined by the National Institute for Health and Care Excellence (NICE) which are a BMI of over 35 and the presence of obesity-related illnesses such as Type 2 diabetes and obstructive sleep apnoea, or a BMI of above 40; however for patients with a BMI of over 50, bariatric surgery can be a first line weight-loss intervention (National Institute for Health and Care Excellence, 2006). Bariatric surgery is generally positioned as an option after other weight-loss methods have been attempted unsuccessfully and is usually perceived as a final option from the perspective of those who seek it.

Depending on the procedure involved, surgery offers restrictive and/or malabsorptive effects which offer long-term and sustained weight loss (Sjöström et al., 2007) and many experience improvement in obesity-related illnesses such as Type 2 Diabetes (Sjöström, 2013), which are generally interpreted as positive changes from a weight-loss and health improvement perspective. Alongside, there is a process of adjustment experienced by people who undergo bariatric surgery, which is underpinned by changes to appearance and eating habits, which may impact on other areas of their lives. There are known societal perceptions and judgements of bariatric surgery, which are largely negative. However, there has been little published work examining this phenomena from the patient perspective, which would provide insight into how bariatric surgery alters peoples’ lives and the individual and common processes used to adjust to a different life in a surgically altered body. Using the narratives of those who have experienced surgery, the findings will contribute towards building more a more informed societal perceptions of
surgery, as it becomes more commonplace as an intervention.

Methods
The research study used grounded theory methodology (Charmaz, 2014) to construct an explanatory theory of how patients adjust to life after bariatric surgery, focusing on the temporality and context in which these adjustments are made in the first two years after surgery. Data have been collected from semi-structured interviews with 15 participants (9 female, 6 male) within two years of surgery.

Summary of results
Early results indicate that participants seek that participants strive to reach an equilibrium between losing weight, learning to live with a new body in terms of appearance, function and re-establishing new social and eating habits. However, further analysis is needed to define the context and conditions in which these occur.

Conclusions
The findings of my research are intended to provide information to those who may seek bariatric surgery in the future, and to inform healthcare professionals and policy makers to help understand the bariatric journey from the patient perspective. By raising awareness of the experiences of those who have experienced bariatric surgery, the research is proposed to contribute towards constructing a greater societal understanding and acceptance of this intervention. This will be increasingly important as trajectories of both adult obesity and bariatric surgery increase according to current predictions.

Bibliography
Valuing varietal diversity: indigenous Canela horticulture in northeast Brazil.

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Abstract

Indigenous societies in lowland South America have an integrated view of ecology, sociology, and cosmology, as demonstrated in numerous studies. The relationship of this view to gardening practices and varietal diversity maintenance has received little analytical attention. This paper addresses the gap in the ethnobotanical and anthropological literature through an exploration of biodiversity and gardening activities in the Jê-speaking Canela indigenous society of northeast Brazil. It demonstrates how the Canela cultivate multiple varieties of many crop species for combined ecological, nutritional, socioeconomic, social-cultural, cosmological, and aesthetic reasons. A particular focus is given to Canela ethnobotanical classification of socio-culturally significant crop species and varietals, including maize, manioc, yam, squash, and beans, as well as other non-native species that have been incorporated into the modern Canela garden. An examination of indigenous horticultural techniques, ritual activities, and conceptualizations of human-plant engagements is also included. The results are based on twelve months of fieldwork carried out in 2011 and 2012-2013 in the Canela village of Escalvado (Maranhão). The original ethnobotanical classificatory lists are the first of their kind for Escalvado village, and constitute ‘living’ documents that will undoubtedly change over time, just as Canela gardens are dynamic and fluid spaces where a series of meaningful human-plant encounters occur. The data examined in this paper show how valuing biodiversity and varietal diversity in particular is central to the Canela worldview, in which society and ecology form a holistic whole.

Introduction

Over the past three to four decades, the lowland regions of South America have become the focus of an increasing
number of anthropological and archaeological studies on human-environment interactions. Archaeological research reveals that pre-Columbian indigenous societies vastly modified and in some cases permanently transformed their environments through a variety of landscape management techniques (Rostain, 2013; Heckenberger, Petersen and Neves, 1999; Wüst and Barretto, 1999). Numerous ethnographic studies demonstrate how modern-day indigenous societies engage with their environments in various ways, including but not limited to ritual activities, mythic storytelling, agricultural techniques, and ethnobotanical classification (cf. Ellen, 2006 for an overview of ethnobiological research in anthropology). There are few studies, however, that approach human-environment relationships in lowland South America through an analysis of gardening practices, and fewer still through an examination of varietal diversity maintenance (cf. Rival, 2001; Clement, Rival and Cole, 2009; Ewart, 2005 for exceptions). This paper seeks to understand the relationship between indigenous conceptualizations of the environment and varietal diversity maintenance in the Canela society of Northeast Brazil.

Indigenous communities throughout the world tend to exhibit multiple and overlapping reasons for conserving biodiversity at the local level, and environmental conservation can be an unintended result of traditional ecological practices (Massey, Bhagwat and Porodong, 2011). In the Canela society, gardeners cultivate multiple varieties of many species for interconnected reasons that are simultaneously ecological, social-cultural, socioeconomic, cosmological, and aesthetic. The aesthetic appreciation of diversity is a key reason the Canela maintain multiple varieties and will be a central focus of this paper. The paper will also demonstrate how Canela conceptualizations of society are inseparable from ecology and cosmology. Not only do crop species and varietals form an integral part of the Canela creative ecological landscape, but they also take part in Canela society as the ‘children’ of female and male gardeners. Thus, understanding varietal diversity maintenance necessitates an examination of the human-plant relationships that are central to Canela gardening experiences. Through an analysis of the multiple ways Canela gardeners engage with crop species and varietals, the paper addresses a gap in the literature on indigenous relationships with the environment in lowland South America and throughout the world.

Living in the legally demarcated Kanela Indigenous Territory (TI Kanela) in the interior of Maranhão state, northeast Brazil, the Ramkokamekra-Canela speak a Timbira language that belongs to the Macro-Jê linguistic stock. Jê communities live primarily in central and northeast Brazil and are known for certain socio-cultural traits including an elaborate annual ritual cycle, matrilocal residence patterns, and a concentric circle village organization with a ceremonial centre (Heelas, 1979). Over 1,800 indigenous Canela live in the TI Kanela, the majority of whom occupy the main village of Escalvado (cf. IBGE, 2010:198). The population density of Escalvado makes it one of the largest...
single indigenous villages in Brazil and in lowland South America. There are two large concentric circles of houses surrounding the ceremonial-political centre, and the family structure of each household is usually a husband and wife with their adult daughters, sons-in-law, and grandchildren. Women own the houses and gardens, and both women and men cultivate garden crops. Men participate in the political life of the village (from which women are generally excluded), and the leadership council is comprised of a male chief, vice-chief, and other established male elders.

The TI Kanela comprises around ten percent of the land originally occupied by the Canela prior to sustained contact with Brazilian colonists at the beginning of the nineteenth century (Crocker, 1994). The modern-day territory incorporates the village of Escalvado, smaller permanent and semi-permanent settlements, and areas for garden plots, hunting, and fishing. Over half of Maranhão state belongs to Brazil’s ‘Legal Amazonia’ region, and the state includes high dense Amazonian forests as well as cerrado (savannah) ecological zones. The cerrado includes diverse biotopes such as gallery and dry seasonal forests, grasslands, woodlands, and swampy palm areas (Felfili et al., 2004). It has a wealth of biological diversity and is being deforested at a more rapid rate than the Amazon region (Klink and Machado, 2005). Documenting the region’s ecological diversity and understanding the role of indigenous communities in maintaining this diversity is therefore of the utmost importance. The Canela utilize many areas of the cerrado landscape and classify nine eco-regions in their territory, including various forest zones, sandy chapada areas, fertile riverbeds, and old gardens. Historically, the community was semi-nomadic and relied more on hunted game and gathered forest products than garden produce, which accounted for an estimated one-fourth of total nutritional intake (Crocker, 1994:95). Modern Canela, however, are subsistence horticulturalists who live in permanent settlements and periodically reside in temporary shelters near their gardens. The annual garden cycle begins with coivara, or slash-and-burn plot preparation, during the dry season in August and September, then planting during the rainy season from October to January or February, and harvesting at the end of the rainy and beginning of the dry season from March to June. Garden crops form the majority of the Canela diet and hunting wild game is a rare occurrence. Meat is mostly supplied through fishing and raising livestock, and is occasionally purchased from local cattle ranchers.

While the Canela society has been the focus of intensive anthropological research, most notably by Nimuendajú (1946); Nimuendajú and Lowie (1937), and Crocker (1982; 1990; 1993; 2004), this study represents the first comprehensive ethnobotanical research undertaken in Escalvado village. To date, there is still a dearth of knowledge regarding lowland South American ethnobotanical classification systems, particularly for those communities living outside of the Amazon region. Two notable studies in central and northeast Brazil are the research of Posey (Posey, 1998; Posey and Plenderleith, 2002) on the Jê-speaking Kayapó and of Balée (1994; 2000; 2010) on the Tupi-Guarani-speaking Ka’aapor. This research draws
from the work of Posey, Balée, and other recent ethnobotanical studies conducted in the Amazonian region (cf. Rival and McKey, 2008; Clement et al., 2010; Arroyo-Kalin, 2010). A number of studies have focused on manioc due to the crop’s nutritional and sociocultural importance in many communities, particularly those of the northwest Amazon (Hugh-Jones, 1979; Rival, 2001; Heckler, 2004). Examining the indigenous cultivation of a single species is analytically useful, as it encourages greater depth of analysis at the ecological, historical, archaeological, and ethnographic levels.

A major focus of the current research is the role of maize in Canela society because this crop is especially valued in ritual activities and mythic storytelling (Miller 2010, 2011). Throughout the fieldwork, however, it became apparent that many crop species and varieties are valued in Canela rituals, myths, ecology, economy, and society. Thus, this article examines a number of cultivated crop species and varieties, with a specific emphasis on varieties of maize, manioc, and yam. These crops are highlighted over others due to the level of varietal diversity each exhibits, as well as the conceptual significance of each species and its varieties in Canela society, ecology, and cosmology. Canela gardens include varieties of many other species as well, including sweet potato, squash, and common bean, and species such as rice and fava bean that are not native to the Americas. The community also cultivates varieties of fruit trees native to the Americas and to the cerrado region in particular, including bitomba, bacuri, and babaçu, among many others. Although these crops are also essential to Canela classification and human-plant relationships, for the sake of brevity their ethnobotanical lists are not included in this article. For the complete Canela crop classification schema, see Miller (forthcoming).

The hypothesis of this study is that Canela gardeners maintain varietal and species diversity in their gardens for a multiplicity of reasons. The research has three main objectives that address this hypothesis: 1) to understand the multiple and overlapping reasons for biodiversity maintenance and loss in Canela gardens; 2) to document the ethno-classification of all crop species and varieties grown in Escalvado village in Canela, Portuguese, and English; and 3) to gain a deeper understanding of Canela relationships with their environment, especially with the plants they cultivate.

Methods

Anthropological fieldwork was conducted in the Canela village of Escalvado, Maranhão state, Brazil, from April 2012 to March 2013, with an initial research visit in July 2011. The data were collected through interviews and quantitative surveys with indigenous informants as well as through participant observation of gardening activities. Interviews were conducted in Portuguese, including Canela vocabulary, with more than twenty female and male adult Canela gardeners. A bilingual member of the community simultaneously translated responses from Canela into Portuguese for participants who only speak their native language. Fourteen interviewees also completed quantitative surveys
documenting all known varieties of crop species currently growing in their garden plots, and all known varieties of seeds or cuttings that were currently being saved (or had been saved in the last few years) for the following planting season. The principles of ethnobotanical research methods, including the ethnobotanical “freelisting” method, were employed (Quinlan, 2005; Martin, 2005; Albuquerque and Lucena, 2004), particularly the emphasis on encouraging participants to name all known cultivated varieties and species. Unlike freelisting, however, the survey participants were given a pre-composed list of varieties that was compiled by the author with the assistance of one female and three male expert Canela gardeners. This was (and remains) a ‘living’ list, with new participants questioning the data available and adding previously unrecognized data to the list.

During the interviews, Canela informants were asked to discuss their planting, tending, and harvesting techniques, garden plot layouts and locations, seed saving practices, seed exchange with family members, neighbours, and other indigenous communities, and culinary and ritual activities involving the garden and its produce. Interviews typically lasted multiple sessions, especially with the four primary Canela gardeners. Participant observation involved visiting garden plots and surveying the crops and cultivation techniques; documenting planting, harvesting, and food processing activities; and participating in and documenting ritual singing, dancing, and feasting. The data were collected through audio recordings and written notes of interviews and surveys, and through photography and audio-visual recordings of crop species and varieties, gardens, and ceremonial events. All interviewees were informed of the research outline and goals prior to their participation, and signed and/or verbally agreed (in an audio recording) to a prior informed consent form written by the author in Portuguese and approved by the University of Oxford’s Central University Research Ethics Committee (CUREC).

Results

Canela ethnobotanical classification: an overview

Varietal diversity in the village of Escalvado has never received focussed analytical attention, yet this study demonstrates that it is a central feature of Canela gardening practices. Maize is a prime example of a crop whose diversity in Canela gardens has been previously unrecognized. Crocker (1990:95) documented four varieties of maize in the early 1960s, but it was unclear whether these had survived after the 1963 messianic movement that resulted in a four-year relocation of the Canela community to the neighbouring Tupi-Guarani-speaking Guajajara territory. While the relocation did result in the loss of some crop varieties and the borrowing of others grown by the Guajajara, it does not appear to have had an overarching negative effect on maize varietal diversity. Table 1 shows that there are currently nine varieties of maize that are commonly grown in Canela gardens, as well as four new varieties that were recently acquired at a government-sponsored seed exchange with other neighbouring Jê communities in Pará state in September 2012. The varieties are morphologically classified
by physical characteristics such as the colour and size of the maize kernels and stalk.

Manioc varieties, on the other hand, are categorized less according to colour, and more according to the size and shape of the tuber, vine, and leaves (see Table 2). The Canela divide manioc into three categories: sweet, of which there are seven varieties; two half-sweet/half-bitter varieties; and bitter, of which there are nine varieties. Bitter manioc contains high amounts of toxic cyanogenic-glucoside in the tuberous roots and must be processed to be safe for human consumption (Elias, Rival and McKey, 2000). Sweet manioc, on the other hand, contains low enough amounts of the toxin that it does not require processing prior to consumption. What is particularly interesting about Canela manioc is the existence of Waiputre and Kŵyr Xenti, the two varieties classified as half-sweet/half-bitter. They both contain enough cyanogenic-glucoside to require processing, but not enough to be considered ‘truly’ bitter or poisonous. The indigenous cultivation of half-sweet/half-bitter manioc varieties is not well documented, and the Canela are perhaps one of the few, if not the only, community to grow and maintain these varieties.

A number of both sweet and bitter manioc varieties are named after plants and animals they resemble, and this is even more apparent with yam varieties (see Tables 3a and 3b). Of the eighteen known Canela yam varieties, eleven reference animals or animal and human body parts, such as the jaguar’s or dog’s head (Krěrô Rop-krâ), the deer’s liver (Krěrô Carâmpa Caxwÿn Tatap-ti), and the female breast (Krěrô Kajåkën). Other yams refer to plants or insects, and one variety, Krěrô Kaj-re, references a type of basket that is used in everyday and ritual activities. Encoding ecological and sociocultural knowledge within ethnobotanical naming is common among many indigenous communities throughout the world (Balée 2000; 2010), and the Canela are no exception. Many fava bean varieties (not listed here) also reference local knowledge and customs, particularly ritual body painting and use of ceremonial masks.

Another important feature of Canela ethnobotanical classification is the addition of the word pej to many varietal names. Pej or impej signifies that which is ‘good,’ beautiful, original, and/or true in the Canela language. In most cases, one variety of the species is classified as pej, such as Pôhy Pej-re. Yams are unique, however, in that an entire subcategory is categorized as Krěrô Pej, or ‘true/original yam.’ These yams are said to be more beautiful and more original to Canela society than the other category of Krěrô, or ‘regular yam.’ Yams were divided into these two categories by the ‘ancestorsvi,’ who deemed Krěrô Pej as more authentically Canela than the other yams. Whether this means the regular yams are not native to the region or were not historically grown by the Canela is unclear. According to modern-day Canela, the ‘ancestors’ devised the classification of most species and varieties, except for those that have been recently introduced into Canela horticulture. Varieties originating outside the village are usually
linguistically coded as such. Kwyr Mînêr, for example, is clearly labelled as ‘macaxeira mineira,’ i.e. sweet manioc originating from the state of Minas Gerais in southeast Brazil.

It is worth noting that all the cultivated crop species in Escalvado are classified into multiple varieties. Most species are divided into between five and twenty varieties, including gourd (six varieties), squash (seven), sweet potato (fifteen), and common bean (sixteen). Rice and fava bean, however, have an impressive twenty-eight and fifty-two documented varieties, respectively. What constitutes a ‘variety’ is dependent on Canela conceptualizations. Therefore, the varieties listed here are phenotypically distinct (as determined by Canela gardeners), but it is not known whether all the varieties are genetically distinct as well. Further anthropological and plant genetic research is needed to determine genetic varietal distinctions.

Cosmological aspects of varietal diversity: origins and shamanic experience

The origins of crop cultivation and varietal diversity are explained in the Canela myth of Caxêtikwyj or Star-Woman. There are many variations of this myth, but the overarching themes remain the same: Star-Woman comes down from the sky and falls in love with Tyc-ti, a Canela man. She shrinks herself and hides in a gourd until Tyc-ti’s sisters or other family members discover her, and she then shows the entire community which plants are edible and teaches them how to cultivate crops. In the most common version, Star-Woman specifically shows the Canela that maize growing on a tree near a bathing hole is edible, and demonstrates how it should be grown, harvested, and consumed (Wilbert, 1978:211). Other versions recorded by the author include Star-Woman teaching people to grow other crops such as sweet and bitter manioc, sweet potato, bean, and native buriti fruit, and a few even mention Star-Woman revealing the varietal diversity of maize and other species as well. The origins of most species and varieties are attributed to Star-Woman, except those that are specifically known to originate in other indigenous communities or come from the non-indigenous Brazilian population. Prior to her arrival, according to the myth, the Canela ate rotten wood and were not aware that edible plants existed in their village.

While all varieties attributed to Star-Woman’s visit are conceived as aboriginal to Canela gardens, some are directly linked to her and are known as impej, including all types of sweet manioc, the two kinds of half-bitter/half-sweet manioc, the ‘true/original’ yam varieties, and all but one variety of maize. Still others that are even more closely associated with Star-Woman are known as impeaj (an augmentative of impej). These include Pôhy Pej-re, Krêrô Pyp-re (Fish Yam), Krêrô Tekâjkaj/Rorti (Anaconda Yam), Arîhy Caprêc-re Kênpê (Small Red Fast-growing Rice), and Arîhy Caprêc-re Kênpôc (Small Red Slow-growing Rice). All types of bitter manioc are associated with Tyc-ti, Star-Woman’s husband, and are known as ihkên, or ugly, untrue, and fierce/dangerous. One variety, Kwyr Tyc-ti (Black-Hair Bitter Manioc), is ihkêãn-re (a diminutive for ihkên) and is even uglier and more dangerous than the rest. According to the myth, Tyc-ti (literally ‘big and black’).
is an especially ugly Canela man and is in effect Star-Woman’s opposite.

The concepts impej and ihkên are essential to Canela society. In the origin of humankind myth, Sun creates impej people in his likeness to inhabit the western side of the village, while Moon creates ihkên people to live in the eastern side (see Panet, 2010:68-69 for another variation of this myth). Categorizing aboriginal crop varieties in this way demonstrates the interconnectedness of ecological and sociocultural concepts. Both types of people are necessary to the harmonious functioning of Canela society, and the same is true for crops growing in the garden plot. All varieties, whether ‘beautiful’ or ‘ugly,’ are maintained because it is the entire spectrum of diversity that is valued. By showing this diversity to the Canela, Star-Woman also taught the people the importance of maintaining these varieties throughout generations.

Maintaining varietal diversity requires developing intimate relationships with every crop species and variety. In Canela cosmology, a variety of nonhuman beings possess agentive capacities and are able to speak and express emotion. Some shamans, known as kay in Canela, can converse and interact with these nonhuman beings, including supernatural entities, animals, some objects and artefacts, and plants. Shamans must undergo intensive food and sex prohibitions known as resguardo to develop various abilities, including curing illnesses, transforming into animals or plants, and communicating with nonhuman beings. Those who have refined their ability to communicate with plants describe their experiences as interactions with ‘plant-people.’ Each species and variety has its own ‘Plant-Man’ and ‘Plant-Woman’ with whom the shaman engages. Maize, for example, appears to the shaman as a species-wide Maize-Woman and Maize-Man, and has variety-specific incarnations as well. All of these ‘plant-people’ have unique characteristics that usually correspond to their physical appearance as plants. Maize-Woman is beautiful with long, shiny hair and perfect teeth, perhaps a reference to straight rows of kernels. Põhy Pej-re-Woman has long white hair, similar to the white tassel on this variety, while Põhy Caprêc-ti-Woman has red hair like the red tassel it develops while growing. One type of Maize-Woman is described as being very small, which presumably is Põhy Kyri-re-Woman.

These ‘plant-people’ typically tell the shaman how they should be cultivated, and express any grievances they may have. Maize-Man, Sweet-Potato-Woman, and Sweet-Manioc-Woman, for example, all remind the shaman where they are living in the garden so the shaman remembers to interact with them. While women own the gardens, both the husband and wife typically create and tend to the plot, and consider themselves the ‘father’ and ‘mother’ of the growing crops. If the couple is not taking sufficient care of the crops, however, the plant-people will complain to the shaman. Growing maize will cry out if its ‘parents’ ignore it, and manioc and potato will express pain if left in the ground for too long. Since only the shaman can hear these cries, he serves as the intermediary between the plant-people and Canela gardeners. He should inform the gardeners of their crops’
unhappiness before they physically relocate to another couple’s plot. Growing crops will move to a more desirable garden if they are being especially mistreated, and the shaman will see them walking away in a single-file line similar to how Canela people walk in a group. The stalks and vines remain in the original plot, but the ‘fruits’ will relocate and not return during the same growing season. Through communicative engagements with the plant-people, therefore, the shaman is valuing and seeking to maintain varietal diversity. Each plant-man and plant-woman is unique and requires its own special attention by the shaman, who happily obliges. While Canela gardeners cannot converse with plants on this level, the next section examines the many ways they engage with their plant ‘children.’

Gardener parents and plant children: the social garden

Female and male gardeners conceive of themselves as the ‘mother’ and ‘father’ of their plant children, and this relationship closely mirrors that of Canela parents and their human children. Just as having a large family with many children is valued in Canela society, so too is maintaining a large garden with many species and varieties. Parents will undergo similar resguardo restrictions for both young children and growing crops, both of which demonstrate the embodied connection between Canela parents and human and plant children. From pregnancy until the child is around six months old, the mother and father must not consume heavy foods, including most meat and fruit, and should refrain from having sexual intercourse. Similar food and sex prohibitions are required for gardeners growing specific crops such as yam, peanut, and fava bean. These restrictions are thought to prevent pollutants from entering the bodies of the couple (cf. Crocker, n.d.:3) and by extension, of the baby and growing crops as well. As the child grows, the bodily connection between parent and child lessens, and the same is true for the plants in the garden. Once harvested, crops are no longer seen as children; rather, they are ‘mature’ and have reached the natural end of their life-cycle.

A bountiful garden is one in which the relationship between the gardener and his or her plant ‘children’ is constantly cultivated and maintained. The plot must be kept clean and well-managed, and only respectful behaviour is permitted such as talking quietly and refraining from arguments. The gardener-crop relationship is especially solidified through singing and food-sharing rituals. While there are many ritual songs for the planting, growing, and harvesting seasons of certain species such as maize, these are primarily sung by a male lead singer during public ceremonial events. In the garden, however, singing is highly individualized and largely depends on personal preference. A gardener who has a larger crop of a certain species such as fava bean or squash will sing songs particular to these species and their varieties. Other gardeners may prefer to grow large amounts of sweet potato, for example, for which there is another specific ritual song. The overarching theme of these songs is to encourage plant growth and keep the growing crops ‘happy.’ Often the gardener will remind the crops she is their mother
and will take care of them while they grow. Although it does not appear that there are specific songs for individual varieties, the ritual song for each species is intended for all its varieties. Crops are said to ‘listen’ to the songs and respond to them by producing an abundant harvest.

The food-sharing ritual is another way to appease the growing plants and ensure a good harvest season. In it, the gardener couple and their extended family will eat hunted game or purchased meat in the garden. The crops are said to share in the feast, eating the meat alongside the humans. All the species and varieties will benefit from eating meat, and the sweet manioc varieties in particular are said to ‘need’ meat to grow abundantly. While this ritual is performed with less frequency than in the past, some families continue to enact it every annual growing season.

The above examples demonstrate how growing crops are incorporated into Canela family structure and society. In addition, crop species are thought to have their own forms of social organization that mirror that of Escalvado village. Yam social organization, for example, has a hierarchical leadership structure akin to the Canela male elder leadership council. Two of the varieties, Krërô Pyp-re (Fish Yam) and Krërô Tekajkaj/Rorti (Anaconda Yam), are the ‘chiefs’ of all the yam varieties, and the ‘vice-chiefs’ or leadership council consists of all four varieties of true/original (Pej) yam (see Tables 3a and 3b). The two ‘chief’ varieties are planted in the middle of the entire yam crop to strengthen and protect the others and help them grow.

It is said that Fish and Anaconda Yam also organize festivals and activities for all the yam varieties, in order to make them happy and promote a harmonious yam ‘society.’ Creating societal happiness (alegria in Portuguese) and harmony through ritual festivities is integral to Canelo village life, and the leadership council manages the annual ritual cycle to ensure the appropriate ceremonial events occur. It appears that creating ‘ecological happiness’ is central to plant life as well, and that this is achieved through human intervention (as seen in ritual events and cultivation practices), and through crop species and varieties’ own agentive capacities. A ‘happy’ garden, therefore, is one in which biodiversity flourishes, with many species and varieties co-existing peacefully with the assistance of their gardener parents.

**Practicing biodiversity maintenance: cultivation and exchange**

The ecological aspects of Canela varietal diversity maintenance are closely tied to sociocultural and cosmological ones. As mentioned above, gardener parents must keep their plots clean, orderly, and tended in order to please their crop children and have an abundant harvest. The primary way the Canela promote and sustain biodiversity is through intercropping, a practice that is common among indigenous horticulturalists and is known to reduce the risk of pests and diseases that target one species (cf. Tuxhill and Nabhan, 2001:184). In an average rectangular garden plot, maize and fava bean, two species that are ecologically complementary, are planted next to each other in vertical rows. Rice, squash, and watermelon lie in parallel
rows, and yam varieties are placed between them. Common bean usually grows around the edge in a horizontal row next to manioc, which is always placed at the edge of garden plots. Peanut and sweet potato varieties require their own separate mini gardens because their roots will interfere with other species in the main plot. Another way to maximize varietal and species diversity is to cultivate more than one plot per year. Some families maintain one plot in the main forested area and another near the riverbank. Since each area has a distinct soil composition and slightly different growing cycle, a family with two plots can grow a wider variety of crops over a longer period and thereby reduce the risk of hunger throughout the year.

Varietal diversity is maintained year after year through the saving of seeds and cuttings, which is primarily a female activity. Certain varietals are often passed down from one generation to another within the extended matrilocal family unit. Women can usually identify which seeds and cuttings they received from their mothers, aunts, and grandmothers, and take care to save these varietals over the years. Gardeners also obtain new varieties or ones they have lost through exchange within and outside Escalvado. Varieties obtained through exchange with neighbouring indigenous communities are often linguistically coded as such. Kwëry Cahnkri-re, for example, literally means ‘Stranger/Foreigner Sweet Manioc,’ and the ‘stranger’ refers to a man from the nearby Jê-speaking Apaniekra community who gave this variety to someone in Escalvado (see Table 2). There is also a type of bean named Pët Juhtoi-re Pàràre/Pryjë, with Pryjë referring to the Tupi-Guarani-speaking Guajajara community. The Canela obtained this variety during their four-year resettlement on Guajajara territory in the mid-1960s, and they continue to cultivate it today. Obtaining new varieties from nearby indigenous societies has been a consistent aspect of Canela gardening throughout history, although it most likely took the form of raiding enemy groups’ garden plots prior to the establishment of peaceful relationships in the twentieth century (cf. Posey, 2002:24-27). Modern-day exchange is done on an individual basis and through government-sponsored seed exchange fairs, such as the one that took place in Pará state in September 2012. The Canela also obtain new seeds and cuttings from local non-indigenous Brazilians, with whom they interact frequently. These new species and varieties are given Portuguese-inspired Canela names, such as Mac for mango (manga in Portuguese), Bacat for avocado (abacate in Portuguese), and the previously mentioned Kwëry Minër sweet manioc variety.

Canela gardeners’ participation in these forms of exchange demonstrates the value placed on crop diversity. Gardeners actively maintain existing varieties and seek out new ones in order to increase the diversity of their garden plots. While it is clear that maintaining varieties originating from mythical Star-Woman is particularly important, the varietal diversity of more recently introduced species is also pursued. For example, some fruit trees have only been introduced to Escalvado over the past few decades, but there are already nine varieties of banana and mango and four of papaya that are commonly grown in the village. Canela society
respects and admires a gardener who maintains a bio-diverse plot. One woman who is known as an expert gardener explained how other Canela come to visit and admire her garden, and how the biodiversity makes their ‘hearts beat quickly.’ This excitement over biodiversity is common in Escalvado. People will often sort seeds and harvested crops in front of their houses, inviting others to view and comment on the varieties they have. New and different varieties, especially colourful patterned varieties of fava and maize, are particularly admired for their beauty. The next section will further examine this aesthetic appreciation of specific varieties and of biodiversity as a whole.

**Canela multi-sensory aesthetics**

A constant feature of maintaining so many varieties is the aesthetic value attributed to varietal diversity. The distinct colours, shapes, and designs of certain varieties are commented on and appreciated for their beauty. People are constantly commenting on the beauty of fava bean varieties, especially those with intricate designs that resemble Canela body painting and/or human physical characteristics. Five varieties of fava bean resemble the designs on ritual masks used during the mask festival, and the swirled markings are seen as particularly striking. Many types of fava are admired for their likeness to specific categories of people. Pánkrýt Pyhti (‘fava urucum/annatto’) is likened to a woman who paints her body with red annatto prior to visiting her garden while menstruating. Another variety, Pánkrýt Měhkra T ámbu, is said to resemble the messy, disorganized body paint design for a mature woman who has already birthed two or three children. There is also a type known as ‘old-person fava’ (Pánkrýt Měhkàa) that looks like the skin of elderly Canela, and a variety called ‘white woman fava’ (Pánkrýt Cupěkwýj) that is said to have red ‘lipstick’ on it. Other crop varieties are appreciated for their vibrant colours, including most varieties of maize (see Table 1), annatto, and some types of squash. Additionally, varieties that resemble animals are thought to be interesting and beautiful, such as ‘jaguar fava’ (Pánkrýt Kroro-re) and ‘jaguar common bean’ (Pát Juhtoi-re Kroro-re), both of which have a spotted pattern. The unique patterns and colouring are what set these varieties apart from others, as well as their resemblance to people and animals thought to be beautiful and distinctive.

What is valued above all else, however, is not particularly beautiful varieties but rather the entire spectrum of biodiversity. Gardeners will line up many different varieties of fava bean or maize seeds in a row, for example, to admire the diverse range of varietal possibilities. Part of this overarching aesthetic appreciation of biodiversity is a desire to increase crop varietal diversity, as seen in seed exchange and in experimentation with existing varieties. While distinct varieties are planted separately to maintain varietal integrity over time, there are instances where crossbreeding occurs unintentionally. Instead of discarding these mixed varieties, some Canela gardeners save the ‘new’ seeds and plant them the following season. An expert gardener explained that she chose to save the
crossbred seeds that ‘appeared’ in her garden in order to increase its overall diversity, which she and her family highly valued.

It is important to note that the Canela aesthetic appreciation of diversity is not limited to the visual realm, but rather incorporates all the senses in an embodied way. Canela gardeners engage with and appreciate plant species and varieties through a series of meaningful, embodied multi-sensory experiences. In the garden, the Canela engage with crops through singing, sharing food, and cultivation techniques. Once harvested, the species and varieties are appreciated for their visual appearance, taste, and smell whilst cooking. Canela aesthetic appreciation also has a moral component. As previously mentioned, the Canela word impej or pej signifies not only that which is beautiful, but simultaneously that which is ‘good,’ true, or original. Thus, Canela multi-sensory aesthetic appreciation is directly linked to moral judgements of what is ‘good’ or ‘true.’ Biodiversity conservation is therefore a morally positive decision that is intimately tied to human-plant engagements enacted in the garden space.

Conclusion

The numerous examples above demonstrate how varietal diversity maintenance is central to Canela cosmology, society, ecology, economy, and a multi-sensory conceptualization of aesthetics. While the myriad reasons for biodiversity conservation are separated into these categories for analytical purposes, the Canela make no such distinctions. Canela ‘society’ incorporates human and nonhuman beings, including plants, animals, most objects and artefacts, and cosmological entities. All of these beings interact and engage with one another in an integrated society-ecology-cosmology. Human-plant relationships in particular take a variety of forms, including a shaman conversing with a plant-man or plant-woman, a gardener singing to her growing crop children, or a family planting a newly-acquired variety. There are times when a supernatural entity such as Star-Woman serve as a mediator between humans and plants, assisting with the development of these relationships. Plants also interact with each other, such as the yam leaders who organize festivals for their yam ‘community.’ Canela gardeners desire and seek out interactions with their garden crops because these plants are their children and form part of Canela ‘society’ in a holistic sense.

Within this integrated society-ecology-cosmology, the environment is conceptualized as series of multi-sensory, embodied engagements among a variety of human and nonhuman beings (cf. Ingold, 2000; 2007; 2011 for a further discussion of a phenomenological understanding of the environment). Thus, maintaining human-nonhuman relationships is at the heart of environmental conservation efforts. In the case of varietal diversity, each variety is engaged with in a distinct way and forms part of a bio-diverse ‘family’ that is understood as impej—both ‘beautiful’ and morally correct. Canela varietal diversity maintenance centres on the conservation of these human-plant relationships, and the forming of new ones to expand the garden family.
This article has shown how examining Canela ethnobotanical classification, cosmological beliefs, cultivation practices, and ritual activities leads to a further understanding of human-plant relationships in the TI Kanela. The value of varietal diversity is demonstrable in the myth of Star-Woman and the origins of horticulture, in shamanic experiences with plants, in food sharing and singing rituals in the garden space, in cultivation techniques such as intercropping, and in seed and cutting exchange within and outside Escalvado. It is also clearly seen in the detailed classification of crop species and varieties, which highlights the importance of ecological knowledge and human-plant engagements. The extensive knowledge of other animal and plant species, for example, is encoded in some varietal names, whereas others demonstrate the close relationship between gardeners and crops. The lists themselves show how Canela gardeners carefully maintain many varietals and remember their names and origins. This has traditionally been an oral history of ethnobotany, and the lists themselves are therefore subject to fluidity over time as some varieties are lost and others are acquired through exchange or ‘appear’ due to unintentional crossbreeding.

Conceptualizing ethnobotanical classification as a ‘living’ project connects it back to Canela gardening, which is itself a dynamic process of multi-sensory, embodied human-plant engagements that occur over time. While the preferred varieties growing in Canela gardens may change throughout the years, the preference for and value placed on varietal diversity as a whole will undoubtedly remain a key part of Canela environmental management.

Acknowledgements

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1 The Ramkokamekra-Canela are related to, but distinct from, the neighbouring Apaniekra-Canela indigenous community. While the two groups speak the same language and exhibit similar socio-cultural traits, each community considers itself a distinct ethno-linguistic group and inhabits its own legally demarcated territory. In this paper, ‘Canela’ refers only to the Ramkokamekra-Canela society.

The Canela refer to one species of bean as ‘fava’ in Portuguese, which would belong to *Vicia faba*, a genus that originated in the Levant (Hanelt and Mettin, 1989). It is as yet...
unclear if these beans are in fact a non-native species or if they are a slightly different variation within the *Phaseolus* genus which is native to the Americas. For the purposes of this article, this class of beans will be referred to as ‘fava,’ which according to the Canela are categorically distinct from the regular ‘bean’ varieties (*feijão* in Portuguese).

‘Ancestors’ is a rough translation of the Portuguese word *bisavós* (literally ‘great-grandparents’), which the Canela use when referring to Canela historical or mythical figures, and often a combination of the two. Canela society does not have any form of ancestor worship or descent by lineage; thus, the term ‘ancestor’ should only be understood in this limited context.

### TABLE 1.

**Varieties of maize (Zea mays L., Poaceae) in Escalvado**

<table>
<thead>
<tr>
<th>Canela name</th>
<th>Translation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Põhy Pej-re</td>
<td>True/original maize</td>
<td>Small, white kernels</td>
</tr>
<tr>
<td>Põhy Capréc-ti</td>
<td>Large red-yellow maize</td>
<td>Large reddish-yellow kernels; produces a large harvest</td>
</tr>
<tr>
<td>Põhy Kror-ti</td>
<td>Large mixed colour maize</td>
<td>Kernels have mixed colours of white, brown, and black</td>
</tr>
<tr>
<td>Põhy Tyc-ti</td>
<td>Large black maize</td>
<td>Large black kernels</td>
</tr>
<tr>
<td>Põhy Tohrom-ti</td>
<td>Large mixed colour maize</td>
<td>Kernels are mixed purple and white</td>
</tr>
<tr>
<td>Põhy Kryi-re</td>
<td>Small maize</td>
<td>Yellow kernels and has a short stalk; ‘friend’ of Põhy Pej-re</td>
</tr>
<tr>
<td>Põhy Jaka-ti</td>
<td>Large white maize</td>
<td>Large white kernels</td>
</tr>
<tr>
<td>Põhy Jiire</td>
<td>Hairy-tail maize</td>
<td>Has a hair ‘tail’ that grows off the end of the ear; not very tasty</td>
</tr>
<tr>
<td>Põhy Capróô-ti</td>
<td>Large bright red maize</td>
<td>Large red kernels the colour of <em>urucum</em> (annatto, <em>Bixa orellana</em> L., Bixaceae)</td>
</tr>
<tr>
<td>Põhy Tatâ-re*</td>
<td>Small yellow-brown maize</td>
<td>Yellowish-brown kernels</td>
</tr>
<tr>
<td>Põhy Tep-re*</td>
<td>Small red maize</td>
<td>Reddish kernels</td>
</tr>
<tr>
<td>Põhy Jiproh-ti*</td>
<td>Large grey maize</td>
<td>Grey kernels</td>
</tr>
<tr>
<td>Põhy Tatap-re*</td>
<td>Small bright yellow maize</td>
<td>Bright yellow kernels the colour of cotton flowers</td>
</tr>
</tbody>
</table>

*Acquired at government-sponsored seed exchange with other Jê communities in September 2012

### TABLE 2.

**Varieties of manioc (Manihot esculenta Crantz, Euphorbiaceae) in Escalvado**

**Sweet manioc (**maçaxing**)

<table>
<thead>
<tr>
<th>Kwýr Cahlkrit-re</th>
<th>Stranger/outsider sweet manioc</th>
<th>Comes from a strange man from the Apaniekrä village of Porquinhos; use to make <em>berihu</em> (manioc-meat pie baked in earthen oven)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kwýr Capréc-re (Kwýr Krýi-re Japý)</td>
<td>Small red parrot-tail sweet manioc</td>
<td>Leaf resembles parrot’s tail; has red skin and white pulp; use to make juice</td>
</tr>
<tr>
<td>Kwyr Kàntep-re</td>
<td>Red sweet manioc</td>
<td>‘Macaxeira cacau’; has grey skin, white pulp, and red membrane/cytoplasm</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Kwyr Xa Jökön-re</td>
<td>Curved-vine sweet manioc</td>
<td>Vine winds around itself</td>
</tr>
<tr>
<td>Kwyryre Hôhpore</td>
<td>Long-leaf sweet manioc</td>
<td>White skin and tasty</td>
</tr>
<tr>
<td>Kwyr Minér</td>
<td>Mineira sweet manioc</td>
<td>‘Macaxeira mineira’ – comes from Minas Gerais state; has white pulp</td>
</tr>
<tr>
<td>Kwyr Mẽhcápôt</td>
<td>Baby/child sweet manioc</td>
<td>Resembles chubby baby’s arm; use to make farinha seca (type of toasted flour – staple of Canela diet), beiju (pancake-like food item) and beribu</td>
</tr>
</tbody>
</table>

**Half-sweet/half-bitter manioc**

<table>
<thead>
<tr>
<th>Waiputre</th>
<th>Hugging vine manioc</th>
<th>Vines wrap around each other; is unique variety that can remain in ground for five years; tapioca has poison but pulp does not</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kwyr Xenti</td>
<td>Not-bitter manioc</td>
<td>Has a little bit of poison in pulp; use to make beribu</td>
</tr>
</tbody>
</table>

**Bitter manioc (mandioca)**

<table>
<thead>
<tr>
<th>Kwyr Hêhtyi</th>
<th>Strong vine bitter manioc</th>
<th>Takes 3 years to grow and use to make farinha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kwyr Tyc-ti (Kwyr Krâ Jimoctyc)</td>
<td>Black-hair bitter manioc</td>
<td>Has black hair on its ‘head’ like the Canela</td>
</tr>
<tr>
<td>Kwyr Pakran-re (Kwyr Caprân Jûkee)</td>
<td>Tortoise-arm bitter manioc</td>
<td>‘Mandioca babuzinha; resembles tortoise arm; has short vine</td>
</tr>
<tr>
<td>Kwyr Caprêc-ti</td>
<td>Large red-yellow bitter manioc</td>
<td>Makes beautiful reddish-yellow farinha but is not very tasty</td>
</tr>
<tr>
<td>Kwyr Awari</td>
<td>Cobra bitter manioc</td>
<td>‘Mandioca naja; pulp resembles flesh of cobra (naja); makes beautiful, tasty yellow farinha</td>
</tr>
<tr>
<td>Kwyr Xatyc-re</td>
<td>Small black vine bitter manioc</td>
<td>Red skin and makes beautiful white farinha</td>
</tr>
<tr>
<td>Kwyr Pytèc Jôkrekà</td>
<td>Rooster wattle forest tree bitter manioc</td>
<td>Resembles rooster’s wattle and the Pytèc tree; makes yellow-red farinha</td>
</tr>
<tr>
<td>Kwyr Mâa Tehkà</td>
<td>Ema shinbone bitter manioc</td>
<td>Resembles shinbone of ema (Rhea americana, species of large bird native to South America)</td>
</tr>
</tbody>
</table>
Varietal diversity in Canela horticulture in Brazil

**TABLE 3A.**

*Varieties of true/original yam (Dioscorea L., Dioscoreaceae) in Escalvado*

<table>
<thead>
<tr>
<th>Canela name</th>
<th>Translation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Krērō Pej Caxwýn Jaka-ti</td>
<td>Large white-‘membrane’ true/original yam</td>
<td>Violet and grey-coloured skin with white pulp and ‘membrane’</td>
</tr>
<tr>
<td>Krērō Pej Caxwýn Kukum-ti</td>
<td>Large brown-violet-‘membrane’ true/original yam</td>
<td>Brown-violet-coloured ‘membrane’</td>
</tr>
<tr>
<td>Krērō Pej Caprân Cre-re</td>
<td>Tortoise egg true/original yam</td>
<td>Shaped like a tortoise egg; has grey skin and white pulp</td>
</tr>
<tr>
<td>Krērō Carâmpa Caxwýn Tatap-ti</td>
<td>Deer liver bright yellow-‘membrane’ yam</td>
<td>Shaped like a deer liver; has bright yellow pulp and ‘membrane’</td>
</tr>
</tbody>
</table>

**TABLE 3B.**

*Varieties of regular yam (Dioscorea L., Dioscoreaceae) in Escalvado*

<table>
<thead>
<tr>
<th>Canela name</th>
<th>Translation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Krērō Pîp-re</td>
<td>Fish yam</td>
<td>‘Yam of the water;’ shaped like <em>poraquê</em> fish (<em>Electrophorus electricus</em>, electric fish native to Amazon basin region); white-coloured, long and thin; more true/original than others</td>
</tr>
<tr>
<td>Krērō Tekājkāj / Rorti</td>
<td>Anaconda yam</td>
<td>Circles around itself similar to an anaconda; white-coloured; also a ‘yam of the water’ and more true/original than others</td>
</tr>
<tr>
<td>Krērō Xa Jîi-re</td>
<td>Spiny/hairy yam</td>
<td>Vine has spiny/hairy; yam is very large and has yellow pulp</td>
</tr>
<tr>
<td>Krērō Parpōhti</td>
<td>Long foot yam</td>
<td>Round and has ‘toes;’ grey-skinned</td>
</tr>
<tr>
<td>Krērō Kàhcapròti</td>
<td>Red-pink-skinned yam</td>
<td>Red/pink-coloured skin</td>
</tr>
<tr>
<td>Krērō Pytixwa</td>
<td><em>Dente de prego</em> yam</td>
<td>Resembles insect that burrows inside the skin; has grey skin</td>
</tr>
</tbody>
</table>
Krêrô Teamijapê (Krêrô Tum Pram) | Yam that multiplies / Grouped yam | Many yams grow together in a cluster on the vine
Krêrô Rôrxô | Babaçu yam | Round and shaped like babaçu fruit (*Attalea speciosa* Mart., Arecaceae)
Krêrô Kryi-re | Small yam | Small with white pulp and grey skin
Krêrô Crehô | Pubic hair yam | Has small hairs on it that resemble pubic hair; grey skin and white pulp
Krêrô Kâjakên | Breast yam | Resembles a human breast in shape; white pulp
Krêrô Kaj-re | Small basket yam | Resembles a small Canela basket (*kaj*); has white pulp
Krêrô Rop-krã | Jaguar’s or dog's head yam | Round and resembles jaguar’s or dog’s head
Krêrô Crô Cre | Pig testicle yam | Round and resembles a pig’s testicle

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Beyond race and ethnicity: How an ethnography of diabetes can contribute to a socially complex approach to hyperglycemia, human suffering, and care.

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Keywords: diabetes mellitus; indigenous peoples; racialization; social suffering; critical phenomenology; care

Abstract

Background: Diabetes mellitus has recently assumed the form of a public health epidemic and novel "epidemic of signification" (Treichler, 1987). Indigenous peoples have been the objects of biomedical discourses that emphasize ethnoracial differences and genetics as etiological factors associated to type 2 diabetes. In response to the racialization of diabetes, anthropologists have reframed "the meaning of diabetes as a socio-political pathology" (Schepfer-Hughes, 2006, p.xviii) and the body as the locus where social history inscribes itself. This paper contributes to this anthropological project by putting forward critical phenomenology as a theoretical and methodological orientation.

Methods: This is a theory-based paper. Core anthropological literature on diabetes from the 1960s to present was reviewed as well as phenomenological philosophy texts.

Results: An ethnographic exploration of the local enactments of care and ways of managing and conceptualizing diabetes may allow us to develop culturally and socially comprehensive medical treatments.

Conclusions: Although genetics do play a role in diabetes, an in-depth analysis of the phenomenon suggests the need to avoid reductionist biomedical approaches and to be aware of the risks implied by the racialization of diabetes. The integration of a phenomenology-inspired approach together with a political economy one in medical anthropology may allow us to look at the indigenous lived experiences of diabetes, while taking into consideration structural violence. Ethnographic research can contribute to a holistic model of care that does not limit itself to therapeutic encounters but incorporates everyday enactments of care and listens to people's concerns.
Diabetes mellitus is not an entirely new phenomenon, but only in recent times has it become of great public concern gaining -- together with non-communicable diseases more generally -- the attention of the World Health Organization, which in 2008 launched an Action Plan for "tackling the world's biggest killers", namely cardiovascular diseases, cancers, diabetes and chronic respiratory diseases (WHO, 2008, p.iii).

Despite the somewhat glib statement that "[W]e have the right vision and knowledge to address these problems" (ibid.), thus implying that difficulties are mainly due to deficient or absent public health policies and not to an understanding of these diseases, a close scrutiny of the discourses produced around diabetes reveals a radically different picture: not only is there no unanimous consensus among scientists about its causes, we find competing paradigms and approaches that emphasize different etiological factors and underpin divergent ideologies and political agendas, with significant social implications in terms of ideas about prevention and treatment interventions. The worldwide rising numbers of people affected by diabetes, the multifactorial nature of the disease, and the failure, to date, to prevent and control it, are some of the key elements that make diabetes a conundrum and a novel "epidemic of signification" (Treichler, 1987) calling for sense-making and the production of a wide array of discourses. The same terminology used for describing diabetes has become an object of debate, since the term "disease" and "illness" are increasingly perceived as too narrow, unable to effectively convey its multivariability and its pertinence to a wider set of medical conditions such as obesity and hypertension. For this reason, diabetes (particularly type 2, or adult onset diabetes) is addressed today as a metabolic "syndrome", a term that is more suited to capture its complexity and the impossibility of reducing it to a single etiology and course.

Among the factors that seem to predispose people to developing type 2 diabetes, there are those "life-styles" that tend to decrease energy expenditure and augment energy intake. It is mainly in this light that anthropologists entered the debate on T2D in the late 1980s, addressing this metabolic disorder as a "disease of modernization" (Lieberman, 2003; McGarvey, et al., 1989; Stunkard and Sorensen, 1993; Zimmet, et al., 2001) or a "disease of civilization" (Joe and Young, 1993). Although the acknowledgment that culture matters in the development of diabetes represented a milestone, anthropologists have moved beyond this achievement and have played an essential role in: 1) "reading" the biomedical, genetic, and epidemiological practices from a critical stance that deconstructs the making of scientific knowledge (epistemological endeavor) and the crafting of social realities (ontological endeavor); 2) reframing diabetes as a socio-political pathology (Ferreira and Lang, 2006) thus contrasting a tendency to de-politicize non-communicable diseases; 3) advocating for a culturally and socially sensitive treatment.

While a review of the anthropological literature on diabetes is beyond the scope of this paper, the key objective here is to explore whether and how anthropologists can make a substantial contribution to
understanding diabetes, to helping tackle it, and to developing new lines of enquiry that lay the groundwork for a socially complex approach to hyperglycemia, human suffering, and care. Thus, the question is: In what ways can an ethnography of diabetes help us gain unique insights into the lived experiences of people with diabetes and into both the proximate and ultimate causes of this pathology? I will try to answer this question by analyzing the shortcomings of a purely biomedical and genetic approach to diabetes with particular reference to the dangers involved in racializing diseases; by exploring the benefits but also the limits of introducing culture in the reframing of diabetes; and by proposing that the integration of a phenomenologically inspired approach and a political economy one in medical anthropology may allow us to look at the indigenous lived experiences and views on what diabetes is, while taking into consideration social inequality and structural violence (Scheper-Hughes, 1992; Wikan, 1990; Good, 1994; Biehl, et al., 2007), and to suggest a holistic model of care that does not limit itself to the therapeutic encounter but incorporates everyday enactments of care and listens to people's "compelling concerns" (Wikan, 1990: 38).

**Diabehnlon?**

The expression "epidemic of signification" was used by Paula Treichler (1987) to lay bare the multiple ways in which AIDS is given meaning and talked about through a semantic work that constitutes the biomedical and the popular practices and discourses. Given the novelty and obscurity of T2D, this semantic (and material) exercise has also become prevalent in diabetes discourse and this linguistic poietic work has been enmeshed in the process of producing social realities. Although the etiological factors associated to T2D are largely environmental and behavioral, ethnoracial differences and genetics have been particular, common catalysts of attention in the biomedical discourse. As Montoya highlights "geneticists, epidemiologists, government analysts, and journalists frame diabetes as an ethnoracial disease" (2011, p.7) thus justifying the practices of blood sampling and extraction of DNA from certain groups of people chosen on the basis of race and ethnicity. Although race and ethnicity are not considered scientific categories but social constructs, they have been used and appropriated by biomedicine and genetics in the attempt to answer why some human groups seem to be more struck by diabetes than others. In fact, diabetes seems to represent a threat for vulnerable populations such as indigenous peoples. Of particular interest has been the case of Native American groups, as for example the Pima, the Inuit, and the Navajo Indians. The rapid rise of T2D among these populations has led to the consideration of genetics as the explanatory key to diabetes. In this regard, the suggestive albeit increasingly criticized theory of the “thrifty gene” elaborated by geneticist James Neel (1962) has provided an appealing explanatory framework. Neel suggested that early hunter-gatherers had acquired a genotype particularly capable of storing energy for later periods of famine. This selective genetic advantage proved to be detrimental with the rapid change of the environmental conditions, the increase
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of food availability, and the end of the feast-or-famine cycle. In other words, the advent of “civilization” supposedly had the effect of turning an advantage into a disadvantage that makes certain populations susceptible to the development of diabetes.

This theory still retains a certain influence in the public, the popular, and part of the scientific discourse. As Margery Fee (2006) underscores, ”a rather unclear scientific hypothesis” (the thrifty genotype) “was transformed into a clearcut racializing account” (2006, p.2990) and achieved relatively popular success. For instance, a recent article in the Mexican online newspaper SinEmbargo.MX reported the findings of a research group of the Laboratory of Diabetes of the Chemistry Faculty at Universidad Nacional Autónoma de México (UNAM): Mexicans are genetically predisposed to diabetes because 70% of their genetic component is, on average, Indigenous (25% Caucasian; 5% African). The indigenous genetic component, "fantastic" in times of famine, has today turned into a problem. The study suggests that diabetes might be eradicated by studying indigenous genetics, and finding and isolating the DNA sequencing responsible for the disease. Genetic modification is, therefore, presented as the solution (Mónica Ocampo, 2013), thus overlooking the dietary, social, political, and ecological causes of diabetes, and justifying the collection of blood samples from people of 13 ethnic groups in Mexico. As Montoya duly remarks: "While all human groups are potential DNA donors, not every group has an equal chance of being targeted for genetics research" (2011, p.151).

This disparity of treatment can be dangerous since scientific narratives can have a racializing effect. The link between knowledge and power is well acknowledged and the capacity to place boundaries and categorize diseases and human groups may have the effect of further stigmatizing and marginalizing the weak while, at the same time, concealing the historical and political factors that influence health and illness. The danger implied in the racialization (and geneticization) of diabetes is particularly serious in countries like Mexico which are characterized by large indigenous populations and histories of colonization and racism, where the discrimination against them can be reinforced by a “scientific” discourse.

The interplay of genetics and ethnicity in the explanation of diabetes gives rise to a twofold process: racial emplacement, i.e. the transformation of group identities into group biologies (Montoya, 2011, p.110) and biosociality, i.e. "a phenomenon whereby individuals appropriate biogenetic discourse as part of their identity" (ibid., p.174). This endeavor has the effect of pathologizing ethnicity and placing the burden of culpability (and responsibility) on people with diabetes themselves, while concealing the political and economic forces exerting power behind and within the diabetic bodies. Indigenous peoples are particularly at risk and might suffer from a disempowering effect: after all, diabetes runs in the blood. The correlation between diabetes and ethnicity may metaphorically create a new identity: the "diabethnic", which is doubly detrimental since it flattens a rich and complex identity upon one single condition (being diabetic), and it marks race or ethnicity from the external (being
classified as indigenous and pertaining to an ethnic group that bears a tainted genetic inheritance).

The point here is not about dismissing the genetic component and role in the development of diabetes but to warn against a reductionist approach that tends to overlook other factors and de-politicize illness. Furthermore, the recent rise of diabetes across the world and diverse populations --what Ferzacca calls “diabetes without borders” (2012, p.416)-- has pointed out that perhaps the genetic etiology is not the most prominent. Different populations show similar incidence rates of diabetes. For instance, Mol underscores that in the Netherlands T2D "has a comparatively high incidence among Hindu immigrants from Surinam" and she asks in what ways "they resemble the Canadian Inuit" (2008, p.64). How many human groups of ex hunter-gatherers should we postulate to explain current trends? How many ethnic groups should we account for? Is the diabethnic a really useful category for understanding diabetes?

Diabetic habits?

If genetics is only one among many components, where should we look for an answer to the diabetes epidemic? Physicians, social scientists, and epidemiologists look at culture change as an important factor that is boosting prevalence rates worldwide. The shift is from people who share genes to people who share habits (Mol 2008, p.65), or better still bad habits: mainly over-eating and/or unhealthy eating and conducting a sedentary life. The concept of "risk factor" is related to that of "lifestyle" which in turn is associated to "control". The key to the biomedical treatment of diabetes lies in the capacity to monitor glycemic indexes through conducting a "healthy" lifestyle and controlling diet. Culture has assumed a prominent role and has become part of biomedical health care strategies that recognize the need to understand patients' backgrounds. Nevertheless, even this culturally comprehensive approach bears its ambiguities: cultural diversity can be perceived as the obstacle to prevention and compliance.

Borovoy and Hine (2008), working with elderly Russian Jewish émigrés to the U.S., a group considered particularly “difficult” with frequent stories of non-compliance, think about how the recent attention of health care providers to cultural differences is actually hampering the delivery of good health services; this is because the concept of “culture” in use is highly reified and encloses “bad patients” into the boundaries of a culture which is conceptualized as an obstacle. In addition, the concept of culture is only applied to patients and not to the doctors (2008, p.3). This approach, based on an unequal power relationship, ends up riddled with ideas of culpability. Borovoy and Hine aim at showing that medical knowledge and praxis are cultural constructs and that the misrecognition of this makes non-compliance automatically fall only on patients’ shoulders. The acknowledgment of the cultural construction of biomedicine is a first step towards an equal, value-free analysis of the different language, health and illness criteria evaluations that take place in the clinical encounter.

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2 For a comprehensive literature review see Ferzacca (2012).
As a consequence of the reification of culture, patients' identities are reduced to their allegedly cultural belonging and are converted into monoliths (Aime 2004, p.54), deprived of their complexities and multiple histories. This procedure is in line with today's tendency to excessively emphasize identity, one identity (ibid., p.56), thus transforming any kind of problem (including non-compliance to a biomedical treatment) in a cultural or ethnic conflict. Risky lifestyles and non-compliance during treatment is not always or only due to "culture". As Steve Ferzacca shows with his study of older American men with T2D, non-compliance does not depend on relevant cultural discrepancies (both patients and physicians share core values such as self-discipline, productivity, and health), or on acts of resistance; escaping an essentialist and static view of structure vs. agency and biomedicine vs. patient lifeworld, Ferzacca suggests "consider[ing] the ways in which the regulated improvisations of le couple médecin-malade are made upon common ground” (2000, p.30; emphasis in the original) and viewing “biopower as a configuration of shared values […] which provides the generative potential for the ‘regulated improvisations’, or hybrid medical practices, illustrative of idiosyncratic ethics and technologies (regimes) in the cultivations of particular lives” (ibid., p.31). Despite sharing cultural values with physicians, these older American men also thought of themselves in a particular phase of their life, retirement, that allowed them to be indulgent (ibid., p.37). This is why "culture" by itself is not enough: particular selves are cultivated differently at diverse times and in particular everyday contexts (ibid., p.37).

Attentiveness to the (multiple) self, to personhood(s), temporal fluidities, and local generative practices makes the anthropological contribution to an understanding of diabetes essential; this is something I return to in the next section. An approach to diabetes based on the extensive use of the concept of “lifestyle”, whether associated to individuals or cultures, is too weak to be revealing and useful. In both cases, Rock (2003) argues, the meanings attached to such practices are overlooked. Thus, lifestyle is “an assemblage of bodily practices that are amenable to quantification” (2003, p.156) but do not reveal anything about local meanings and knowledge. In fact, "lifestyle' differs from culture" (ibid., p.155) and “to prove effective, interventions need to resonate with local knowledge and to address local circumstance” (ibid., p.157). The fact that different populations may show a similar lifestyle does not help us to tailor health interventions since the deep understandings, the local ways of thinking are set apart. Lifestyles cannot be abstracted from other factors such as social structure, environment, history, and political economy, and an understanding of the onset, development, and experience of T2D would benefit from an approach which takes into consideration lived experiences in particular times and places within contexts influenced and limited by broader political economic forces.

According to Melanie Rock, the social suffering approach promoted by (part of) anthropology to health issues “can assist in explicating why, in the
contemporary period, blood tends to be sweeter in some populations than in others” (ibid., p.163). This approach has allowed us to identify the bidirectionality of diabetes and stress, and, as a consequence, to go beyond race and ethnicity and ask "whether suffering is more common in some populations than in others and, if so, why" (ibid., p.163). As evident from the preceding discussion, attention to human suffering as lived, embodied, and expressed in particular circumstances calls for ethnographies of diabetes which listen to the voices of people with diabetes, attend to their concerns, resonate with local contexts, and recognize the interrelation existing between wider pathogenic systems based on inequality and social injustice and diseases such as diabetes. In the next paragraph I show how this can be accomplished by adopting, theoretically and methodologically, a phenomenologically inspired approach.

Diabetes as a diglossic space: speaking and sentient bodies as thrown subjectivities

Medical anthropology, more than other fields in anthropology, has recognized the importance of placing the body in sharp focus and at the center of its analysis. While earlier theoretical approaches such as functionalism and structuralism did somehow include the body in ethnographic descriptions and observations, they did so in a rather abstract way and considered it an instrument or reflection of society at large. This way of dealing with the body was largely ahistorical and deprived of temporality: the body was conceived as the universal substratum upon which culture is inscribed. This led to the later tendency to "read" the body as a text and to bracket emotions, empathy, and the senses. As Green notices, "the body itself remained unproblematized until quite recently" (1998, pp.3-4) excepting important contributions such as those of Bourdieu (1977) and Foucault (1981, 1991). Nevertheless, despite the attention paid to biopower, forms of control, representation, and self-discipline, the body was still paradoxically rather "disembodied". Phenomenology, roughly definable as a philosophical movement or orientation, has had the merit of helping "anthropologists to reconfigure what it means to be human, to have a body, to suffer and to heal, and to live among others" (Desjarlais and Throop, 2011, p.88). From the 1980s onwards, the body has become problematic (Csordas, 1994) and an inspiring source of new theoretical orientations and ways of doing ethnographic research. Since then, new fields of study have burgeoned in anthropology, such as sensory anthropology (Classen, 1990, 1993; Geurts, 2002; Howes, 1991, 2003; Seremetakis, 1994; Stoller, 1989, 1997; Sutton, 2001), the anthropology of emotions (Lutz and White, 1986; Desjarlais, 1992; Shepard, 2002), the anthropology of violence and social suffering (Green, 1998; Schepers-Hughes, 1992; Farmer, 2003; Das, 2007; Roma, 2007), just to mention a few. They all have benefited from concepts of phenomenological inspiration such as embodiment, thrownness, being-in-the-world, intersubjectivity.

The adoption of phenomenological approaches in medicine...
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Anthropology has allowed for the introduction of objects of inquiry that had been by and large overlooked. For instance, Biehl et al., (2007) have underscored the importance of including subjectivity in anthropological investigations and the urgency of defeating the fear of falling inevitably into a psychologization or universalization of subjectivity, while Kleinman and Fitz-Henry (2007) and Throop (2003) advocate for an analysis of experience, perhaps a slippery and unsatisfactory concept, but nevertheless overtly necessary.

The phenomenological attention to subjectivity, personhood, preobjectivity, and experience often suffers the critique of downplaying the social and the cultural. In my opinion, this interpretation is based on a flawed reading of phenomenologically inspired works. The contribution of the philosopher Martin Heidegger (1927) provides us with an epistemological framework that fruitfully articulates subjectivity and objectivity, intentionality and constraint, agency and structure. In fact, the profound sense of the being is ultimately its being-there, Dasein, thrown, situated in a specific context, "located" in a "non-equivalent position in a substantive web of connections" (Haraway as illustrated by Csordas, 1994). The thrown character of Dasein inevitably entails its historicity, temporality, and fluidity in contrast with a Western philosophical tradition that had identified the being as that which is permanent (Vattimo, 2011, p.11) and unconditioned. Dasein is thrown and limited, placed in the world, along with others, and always endowed with a "mood" that although ontologically different from emotion, is ontically linked to it. Dasein is also a project, animated by a desire to change or maintain its condition (ibid., p.15). We are in the world to make a project out of ourselves: life is an array of possibilities, not infinite though. Death is the ultimate, certain, and permanent possibility which makes all the other possibilities possible. Life is, therefore, a synonym of existence which can be defined as ex-sistere, transcendence situated into the world (ibid., pp.56-57).

Stripped down to its essentials, phenomenology clearly involves the collapse of any sharp antinomy between subjectivity and objectivity, projectuality and constraint, transcendence and situatedness, a theoretical achievement that well suits social anthropology and even more medical anthropology. Although this account of phenomenology is not detailed in any way, I think it allows me to hint at what the adoption of this approach can contribute to an ethnography of diabetes and the formulation of a holistic model of care. In fact, the appreciation of the specificity of human experience makes ethnography a valuable instrument for exploring the lived experiences of people with diabetes, being aware that a universal model of care cannot be conceived and applied to a "variety of human conditions within which often greatly different things are at stake" (Kleinman and Fitz-Henry, 2007, p.55), even though they might be sharing the experience of suffering from hyperglycemia.

Attention to local engagements and compelling concerns (Wikan, 1990) is key to an understanding of the sweetening of the blood. Embodiment is the paradigm that best recognizes the multiple ways in which human suffering
is lived through, felt, listened to, silenced, and expressed. Several anthropological works have recognized the capacity history and macroprocesses have to inscribe themselves into the bodies (Scheper-Hughes and Lock, 1987; Stoller, 1995) and how these in turn can remember (Becker, 1997; Cartwright, 2007; Casey, 1987; Fassin, 2007; Nichter, 1981). An ethnography of diabetes which explores how indigenous peoples are engaged in this process of "bodily remembering" (Casey, 1987), i.e. body memory and memory of the body, can shed light on a set of related issues: how diabetes is experienced, understood, explained, and made sense of in specific locations; how macroprocesses "remake [the] most intimate inner processes: emotion, cognitive style, memory, [the] deepest sense of self" (Kleinman and Fitz-Henry 2007: 55) and contribute to the susceptibility of certain people to diabetes; how people with diabetes conceptualize well-being and strive to transform or maintain their lives through everyday enactments of care.

The main challenge in such an anthropological project is to interpret diabetes as a "diglossic" context where corporeality and bodily memory coexist, in a continuum, with language and memory of the body. This explains why my attempt is to reconcile the perceiving and the speaking body, the realms of emotions, feelings, and sensations and the realms of storytelling, praying, singing, talking, conversing. If we adopt a gestural theory of language (Leonard, 2013) drawn from Merleau-Ponty's (1945) philosophy then there is no substantial opposition between embodied practices and language. Human suffering becomes accessible by listening to people's words but also by accessing their sensations and resonating with their experiences. Empathy, a key element for any ethnographic work, reemerges as a methodological and heuristic tool (Wikan, 1992; Hollan and Throop, 2008; Hollan, 2008, 2012; Gieser, 2008).

The anthropological literature on diabetes has largely emphasized the narrative dimension of inquiry, partly overlooking the sensory aspect of lived experiences. The seriousness with which anthropologists have approached and listened to the lay discourses on diabetes has led them to highlight the special relationship existing between stress and diabetes. The recognition of this link has been indicated as one of the distinctive contributions of anthropology to the study of diabetes. As Schoenberg et al. (2005, p.174) write:

'With some exceptions (Hinkle and Wolf 1952), attention to life history and circumstances has fallen outside the purview of biomedical research and practice but has been a defining characteristic of anthropological inquiry into diabetes (Walrath 2003).'

The most challenging claim of the researchers dealing with this theme is the bidirectional nature of diabetes and stress and/or depression (Cabassa, et al., 2008; Ferreira and Lang, 2006; Iwasaki, et al., 2004, 2005; Mendenhall, et al., 2012; Mendenhall and Jacobs, 2012; Mendenhall, et al., 2010; Rock, 2003; Schoenberg, et al., 2005). This means that not only the chronic condition suffered by people with diabetes can lead them to depression, but also the other

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4 In linguistics, diglossia refers to two varieties of the same language, usually spoken in different sets of circumstances. Here the term is used metaphorically.
way round, namely that harsh and prolonged conditions of stress can contribute to the development of diabetes. I argue that this finding would benefit from the integration of stories on diabetes with the ways bodies are experienced, felt, interpreted, perceived, lived through. We need to include sensory categories and perceptions, emotions, and the processes through which people with diabetes distinguish ‘fine’ from ‘sick’ (Hay, 2008).

The reconciliation of the speaking and the perceiving body naturally binds together phenomenology with political economy. For instance, an exploration of the local indigenous sensorium and of the sensorium of people with diabetes can help to tease out both lived food experiences (Ferzacca, 2004) and the food policies that have changed Mexican tables and palates (Pilcher, 1998). Dasein is always thrown within a historical, cultural, political horizon. As Thompson and Gifford’s (2000) ethnography on Melbourne Aborigines shows, “When Melbourne Aborigines talk about trying to manage their diabetes, it is not only their sugar that is out of balance, it is their whole life” (2000, p.1458). Aborigines’ narratives about balance and diabetes display a lucid and conscious understanding of the historical (past and present) politics that have boosted the epidemic. They describe “sugar” as something introduced from outside, from the “white man”, and they link its presence to a series of disruptive occurrences, including the loss of land and the consequential severance of connections between land and kin (ibid., p.1462). For this reason, diabetes cannot be separated from a history of dispossession, colonization, and marginalization. The struggle to keep a balance (mirrored in the outcome of the glycemic values) stands as a wider metaphor that speaks about the struggle to survive as a community in the face of threatening forces. “The unpredictability of sugar levels” mirrors “the unpredictability of life in general” (ibid., p.1465) which in turn explains why Aborigines give more attention to the present than to the future. The way Aborigines are able to link their illness with wider circumstances that involve family, community, society and environmental ties, openly challenges scientific approaches that deal with diabetes through an individual risk factor paradigm.

Again, the study of narratives of people with diabetes, especially if integrated with an exploration of bodily memory and lifeworld, reveals what a strong contribution ethnography can bring to health studies and why a mere account of lifestyles cannot be regarded as sufficient to stem diabetes. Ethnographies of diabetes have the potential to disclose the possible connections between health, identity, ethnicity (not as a reified entity), place, land, and the dispute over natural resources. They propose an integrated perspective of culture (Campbell, 2010) that captures the imponderabilia of actual life (Malinowski, 1922, p.18) while critically "seeing the entire situation in a given community" (Campbell, 2010, p.78). They also reaffirm the need of moving towards ethno-epidemiological models, or what Nancy Scheper-Hughes indicates as “Indigenous models and understandings” (2006, p.xxi).

A holistic model of care
The anthropological project outlined above has important implications on a practical level which suggest new paths in health policies and programs. The integration of a phenomenological and a political economy approach inevitably entails the assumption of a holistic model of care that does not limit itself to the therapeutic encounter but tries to address both the proximate and ultimate causes of suffering by identifying what Wikan (1990) calls people's "compelling concerns". In this section I aim at establishing the ontological and philosophical basis for a culturally and socially grounded strategy of care. I contend that to contribute to the definition of medical models capable of responding to people's concerns and ideals of well-being, and reformulate ideas of medical efficacy we need a philosophical reconceptualization of "care". Only by exploring the ontological and ontic dimensions of care, can we hope to contribute to a better, more comprehensive, and collective view of health and health-seeking processes. I shall argue that this can be done through an analysis of Martin Heidegger's reflection on Dasein and care. Although I will draw directly on his widely interpreted work "Being and Time" (1962 [1927]), I have to point out that I am not a philosopher, nor am I concerned with the philosophical hermeneutic debate on Heidegger's heritage. Suffice it to say that the discussion that follows is creatively personal and its raison d'être lies in the belief that an exploration of his work can provide us with a new epistemological horizon within which promising approaches to care come to the forefront.

The philosophical endeavor undertaken by Heidegger aims at going back to the primordial question of Ancient Greek philosophers, namely the study of Being in itself. Heidegger's approach also manifests an aspiration towards "totality" that resembles Hegel's concern with the Spirit and its phenomenological unraveling in history. The necessity to re-establish the primacy of ontology over the ontic is what makes Heidegger wonder about the primordial totality of Dasein's structural whole (1962, p.225). As said before, according to Heidegger, Dasein is characterized by its "thrownness", Being-in-the-world, and its being always ahead of itself, projected in its possibilities. The reconciliation of these existential dimensions of Dasein is intrinsically reconstituted by care, which is its very pre-ontological condition. Care is at the basis of any other state of being, or mood; it is their precondition, therefore the primordial dimension of Dasein. Heidegger also suggests that Dasein is "fallen" and is caught in an "inauthentic life" that closes its horizons within the boundaries of the "presence-at-hand" ('Reality', 'world actuality'). This divide between inauthenticity and authenticity, ontical and ontological, can easily be misunderstood as the replication of a Western dichotomy between the empirical and the ideal, the phenomenon and the noumenon. This is not so, since the act of consciousness that reveals the fallen character of Dasein and leads to the ontological discovery of Dasein's authenticity brings us back to the existential acknowledgment that Dasein is Being-in-the-world, and Dasein's Being is care. Thus, the divorce of facticity and Being in itself is only apparent and is solved by care, which is
both the precondition and the ultimate station of Dasein's journey: "This lies in demonstrating that no sooner has Dasein expressed anything about itself to itself, than it has already interpreted itself as care (cura), even though it has done so only pre-ontologically" (ibid., p.227).

Even though care is the totality that brings unity to Dasein, other states-of-mind can reveal the nature of Dasein. Anxiety, fear, concern, and solicitude are states-of-mind that, depending on care, facilitate Dasein's own disclosing. According to Heidegger, anxiety is a sense that derives from our acknowledgment that "[W]hat oppresses us is not this or that, nor is it the summation of everything present-at-hand; it is rather the possibility of the ready-to-hand in general; that is to say, it is the world itself." (ibid., p.231). So, anxiety reveals Dasein's Being-possible character (ibid., p.232). In this sense, anxiety is a pervasive state directed towards no threat as such but towards what Kierkegaard had called the "dizziness of freedom" (1980, p.61). Thus, anxiety is the state-of-mind that discloses Dasein's projection towards its ownmost possibilities and its "being-ahead-of-itself" (1962, p.236). Anxiety reveals projection but also thrownness into a world (ibid., p.236), thus disclosing that Dasein is "ahead-of-itself-in-already-being-in-a-world" (ibid.). Ontologically, these features are reconstituted into the unity of care. Ontically, they find expression in concern, i.e. being-alongside-things-ready-to-hand; solicitude, i.e. being-with-the-others (ibid., p.237); and willing, i.e. the act by which Dasein commits itself to be concerned with an entity (ibid., p.239).

All these phenomena constantly bring together a threefold existential pattern: being-ahead-of-itself; being-already; potentiality-for-Being (ibid.). Throughout his work, Heidegger mentions a number of moods such as will, wish, addiction, urge, worry, grief, devotedness, etc., all of which founded upon care, namely thrown projection.

The importance and significance of Heidegger's contribution for a reconceptualization of care in medical anthropology lies in the fact that care is recognized as the ontological premise of Being and that the world is meaningful as long as it is care-full. As Michael Inwood explains, "[O]nly if Dasein is care can it dwell in a significant world, and only if it dwells in a significant world can Dasein be care" (2000, p.59). By saying and appreciating this, care ceases to be a practice confined to particular and limited conditions and times of one's life (for example disease), and becomes an ontological precondition for life itself, shared by humans, non-humans, things, and the environment, as well as engaged and enacted personally and collectively on a daily basis. In this sense, my conceptualization of care is close to that of Fisher and Tronto (1990) who define it as:

'a species activity that includes everything that we do to maintain, continue, and repair our "world" so that we can live in it as well as possible. That world includes our bodies, our selves, and our environment, all of which we seek to interweave in a complex, life sustaining web. (cited in Tronto 2006).'

Therefore, we can say that care has a total and existential character that calls for a more conscious recognition of its
role and a phenomenological engagement that takes issue with objectifying definitions of care and encourages intersubjective disclosures of it. Furthermore, this approach makes us sensitive to the manifold modalities and aspects of care that risk disappearing into the shadows of the fabric of everyday life, while they have "already been disclosed in an ontico-existentiell manner" (1962, p.241) and ask for their being included into medical models of care and cure. This is a very important point, for it confers dignity on experiential knowledge, everyday enactments of care, and what Aristotle defined as phronesis, "the cautious intelligence that, context by context, evaluates which aspect of practical knowledge to activate in relation to a certain circumstance"5 (Tommasi, 2011, p.1).

Culturally specific studies of care and everyday practice can be anchored in this ontological framework that simultaneously recognizes the fundamental character of care to human life and its historical, social, and cultural specificity. An ethnography of diabetes would, therefore, explore the ways in which well-being is locally conceptualized and nourished in everyday life.

Another important point that Heidegger's exploration of care raises, is that of temporality. Care is embedded in the temporal dimension, given the fact that Dasein's Being is a thrown projection, constantly ahead of itself and already there. "Temporality gets experienced in a phenomenally primordial way in Dasein's authentic Being-a-whole, in the phenomenon of anticipatory resoluteness" (1962, p.351). The temporal dimension of Dasein has to do with the consciousness of death, or Being-towards-death, something Ancient Romans summarized in the Latin reminder memento mori. Death is not conceived as an episode that concludes life but as a constitutive omnipresent condition. In Heidegger's (ibid., p.354) words:

'Death is not 'added on' to Dasein at its 'end'; but Dasein, as care, is the thrown (that is, null) basis for its death. The nullity by which Dasein's Being is dominated primordially through and through, is revealed to Dasein itself in authentic Being-towards-death'.

Resoluteness lies in this certainty which is incessantly anticipated. The projection towards the end molds the sense of selfhood and permits one to give sense to life. The mortal condition of Dasein is what confers to life the impulse to make projects and forge the self in conjunction with the world it is thrown into. This explains the within-time-ness of the Being-in-the-world; Dasein discloses and uncovers itself by projecting itself "upon that uttermost possibility which lies ahead of every factual potentiality-for-Being of Dasein" (ibid., p.349). This clearly means that the idea of the self is something that does not take shape from a vacuum that allows unconditioned freedom and random possibilities but that the "already-there" character of Dasein provides the ontological and ontical dimension that anchors the self within a net of relations. Not only Dasein's Being is "Being-already-there", but is also "Being-with-others" and "Being-
alongside-entities-within-the-world". This is why, as Ricoeur highlights, no possibility exists without memory of the past. "Retrospection is reconnected to anticipation, and anticipation is rooted in retrospection" (1981, p.178). The structural dimension of death and its pervasiveness make any act an act of care, both in the sense of caring about something and taking care of something (Inwood, 2000, p.58). Again, care is not an activity performed by certain actors at certain times, but, rather, a collective ongoing process that looks ahead and back in order to take action in the present. In this perspective, care implies the repairing as well as the crafting of the self and the world towards ideals of good that are grounded in memory and are projected into the future. Care has to do with the idea of who we want to be (possibility) and how we can accomplish it with what is ready to hand. "When fully conceived, the care-structure includes the phenomenon of Selfhood" (1962, p.370) which is never isolated, sovereign, and permanent. The constancy of the self finds a place only in Dasein's Being as care (ibid., p.369). And care brings us back to the dimension of temporality which works insofar as the being-ahead-of-itself character is interwoven with the already-there and the being-alongside (ibid., p.375).

What are the implications of these speculations to a reconceptualization of care? First of all, the critique to the isolated subject reminds us that the self "is enfolded ab initio within a web of relationships" (Dunne, 1995, p.144) and that only from this web of relations can the self become aware of its ongoing engagement in taking care of and caring about something/someone. Thus, relatedness becomes the center of any act of care, even when directed to the self. This openly challenges individualistic logics of care that, for instance, conceptualize care in terms of punctual interventions offered or sold to patients who are either free (bounded) citizens or customers (Mol, 2008). Care should not be seen as an activity urgently needed at times of crisis but as an ongoing process that not only repairs but also crafts. Secondly, in this light, care and the need for it become the duty and right of all individuals, thus blurring the divides between those who consider themselves or are considered able and the unable, the strong and the weak, the healthy and the ill. As Tronto duly points out: "The presumption that only the vulnerable need care, [...], belies our common human fate of depending upon others" (2006, p.17). Thirdly, once the ontological dimension of care is fully acknowledged, then it becomes easier to look at the ontical dimension of it and identify (valorize) all those daily acts of care that go overlooked in the flow of life. In particular, all those gestures that do not make themselves tangible in discrete ever-lasting products but attest to care demand attention. As Italian feminist Carla Lonzi wrote, these practices of care are "gestures in the air, as those of the equilibrists, gestures done of air. Upon these gestures with no final concretization, our life is built"6 (2010 [1978], p.614). These words recall those of anthropologist Anderson who defined food history as a "history without names" (2005, p.2). Food preparation is a primordial act of care that does not leave names in history; the product of

6 "[Gesti] che non diventano un prodotto, ma solo un accudire. Gesti nell'aria come quelli degli equilibristi, gesti fatti d'aria. Su questi gesti senza seguito è costruita la nostra vita".
care, food, disappears, therefore, cooking albeit corporeal is ultimately a gesture in the air. Fourthly, the experience of worry, will, wish, concern, fear, anxiety, solicitude, etc. reveals the projection of the self upon the world and discloses what merits affection and the idea of good. Care becomes enmeshed in the making of personal and social realities, and reveals its transformative power. This allows us to bring into focus more complex forms of care and cure. Although not all therapeutic interventions are considered transformative by patients and healers, and some only aim at restoring a previous state of perceived well-being (Waldram, 2013), they all entail a vision and the active accomplishment of the self. During therapies, patients, healers, and all the actors involved in the process bring their concerns, worries, and ideas of well-being. The therapeutic encounter becomes inhabited and experienced by ideas of the good that have been molded throughout time and enacted through the ontical dimension of care.

In this light, the project of anthropologists (Cabassa, et al., 2008; Ferreira and Lang, 2006; Iwasaki, et al., 2004, 2005; Mendenhall, et al., 2010; Mendenhall, et al., 2012), who are committed to a "liberation medicine" (Schepers-Hughes, 2006, p.xxi), investigates and proposes "culturally relevant empowerment-oriented diabetes management strategies to promote mastery and life quality among Aboriginal peoples with diabetes" (Iwasaki, et al., 2005, p.978) and should be endorsed. The central idea of this project is the identification of indigenous people's coping strategies, everyday practices of care, and conceptualizations of well-being in order to incorporate them into models of care. Although I believe this is the most promising approach to diabetes prevention and treatment, I also feel it is important to mention the risk of unproblematizing indigenous "traditions" and medical knowledge. As recent studies have highlighted, the very concepts of "indigenous" (McIntosh, et al., 2002), "traditional", and "authentic" (Theodossopoulos, 2013) are not conflict-free. If, for example, we look at traditional ways of preparing and consuming food we might find that certain commodities considered unhealthy from a biomedical point of view have been adopted and are considered important for the maintenance of social cohesion and well-being. Tastes, as well as concepts of health and well-being, can be uncertain and ambivalent (Holtzman, 2009). Facing these ambiguities, anthropologists as much as physicians might fall into the temptation of assuming the authority of arbiters of healthy and unhealthy indigenous habits, a practice that too closely resembles the twentieth-century indigenist policies of Mexico and Latin America we all consider part of a past and obsolete project of nationhood. The attempt to formulate a holistic model of care calls into question the political position of medical anthropologists, often hesitating between a cultural broker or a critical role, especially when "the interests and goals of doctors and their patients do not always coincide" (Schepers-Hughes, 1990, p.190). This paper, therefore, concludes in a two-fold way: proposing directions for a socially complex understanding of diabetes and the crafting of a holistic model of care, but also posing unsolved questions and
challenges for the future of medical anthropology and health care strategies in general.

**Conclusion**

Indigenous peoples worldwide are experiencing the burden of noncommunicable diseases and diabetes. The unequal distribution of illness demands explanations and sense making. The ways in which diabetes is framed, addressed, and described have crucial implications in terms of research agendas and health care strategies. A vast array of discourses is being produced from a variety of actors placed on a continuum where no clear-cut distinction can be traced between the popular and the scientific. Medical anthropologists are participating in this enterprise and should therefore interrogate themselves about their roles in and their contributions to an understanding of diabetes. My initial question was concerned with whether or not, and the ways in which, an ethnography of diabetes can provide unique insights into the lived experiences of people with diabetes and into both the proximate and ultimate causes of it. My answer is that anthropologists are well-equipped to give a significant contribution towards an understanding of diabetes and the crafting of medical models of care. However, this statement is not sufficient. In order to substantiate it, it behooves us to clarify the ontological and epistemological premises of our investigation and political contribution.

I have argued that a socially complex approach to hyperglycemia, human suffering, and care can be theoretically grounded in a framework that integrates a phenomenologically inspired approach with a political economy one, thus obviating the possible flaws of both standpoints. In particular, I have shown that the attention paid by phenomenology to subjectivity and lived experiences inevitably leads to the consideration of larger socio-political forces: political economy is the "natural" completion of any phenomenologically inspired analysis. This is particularly evident when dealing with bodily memory, both in its incarnate fashion and linguistic expression. Bodies are lived through and listened to, constantly pre-objectively and intentionally experienced, loci from which experience is arrayed (Desjarlais and Throop, 2011, p.89), receivers and providers of care. This is why an ethnography of diabetes cannot be focused only on the speaking body but also on the perceiving body, although they should not be dealt with in a dichotomized way, given that speech is incarnate as much as the senses are spoken.

One of the strongest contributions of anthropologists to the study of diabetes has been the recognition that “racial” and ethnic differences are relevant only insofar as they mirror social disparities and structural inequalities. In this sense, the epidemiological map of diabetes can trace the lines of social suffering. Diabetes is therefore the embodiment of social, political, and economic stratification. This is a broad hint that diabetes cannot be successfully tackled unless the social, political and economic inequalities are reduced. Anthropologists can look at history at work at the global level and history as lived in local space, the state policies and the politics of
subjects (Fassin, 2007, p.xvii). In this light, bodies remember as much as they feel and they become objects of reflection and subjects of political (in its broader sense) action.

Thus, any ethnography of diabetes should integrate an exploration of historical processes with consideration for the lived experiences of suffering and distress. Phenomenology, especially an Heideggerian inspired one, provides a challenging but promising approach that permits us to establish the ontological premises of care while taking into consideration culturally specific ideals and enactments of well-being, health, and illness. The conceptualization of Dasein as thrown projection reminds us how each life is engaged in an existential struggle towards the everyday nourishment of an authentic self project, and how this process is always and at any time grounded, limited, and contextually specific. The self is, therefore, an oxymoron: a situated transcendence. The acknowledgment of this ontological premise is theoretically, methodologically, and politically relevant for medical anthropologists: the movement towards a "liberation medicine" (Scheper-Hughes, 2006, p.xxi) entails the assumption of a role that should aim at facilitating indigenous peoples' projection towards their ownmost possibilities, or authenticity. This project resonates with Mexican anthropologist Guillermo Bonfil Batalla's idea of "etnodesarrollo" (ethnodvelopment strategy), which is the right of indigenes to decide autonomously about their own destiny (Bonfil Batalla, 1970). In this endeavor, the anthropologist is called to abide by the indigenous decisions and to be at the service of human liberation, assuming a militant and politically active role in favor of the dis-alienation of cultures. Perhaps, the first step towards such a project is a reconceptualization of care that is attentive to people's concerns (being-alongside-things-ready-to-hand), sollicitudes (being-with-the-others), and willingness. The result is a holistic model of care that is conceived as a collective ongoing process, expressed in a manifold modality, and through everyday gestures, including "gestures in the air". If we considering well-being in its wider sense, then human suffering and potentiality for Being cannot be severed from the broader pathogenic circumstances in which they are thrown, such as the dispossession of aboriginal land and violations of indigenous rights.

The main challenge of this project lies, therefore, in the ways we decide to look critically at diabetes prevention and treatment. Although this article does not provide any ultimate answer, it does clarify the philosophical and anthropological basis for a liberation medical model that goes beyond race and ethnicity and aims at illuminating culturally specific features of care, which are projected towards indigenous peoples with diabetes' ownmost possibilities and thrown into specific historical contexts marked by political economic forces and trajectories.

**Bibliography**


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Beyond race and ethnicity: an ethnography of diabetes


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The subsistence minimum (defined in 1995 by the Institute of Labour and Social Studies, the Office of National Statistics and the World Bank) refers to the minimal level of subsistence needed to avoid physical collapse/illness, and is a measure of very low income. The subsistence minimum is more than twice lower than social minimum (see 3).

The relative poverty line (as calculated by the Polish Office of National Statistics) is equal to 50% average expenditure per unit of consumption, weighted by number of householders. The social minimum refers to a poverty measure of 'minimum material security' developed in former Soviet block countries. It was designed to capture the indispensable minimum level of consumption (both economic and cultural) needed for social participation and integration. This is not an explicit measure of poverty per se, but is used as a symptom of poverty.

The Ramkokamekra-Canela are related to, but distinct from, the neighbouring Apaniekra-Canela indigenous community. While the two groups speak the same language and exhibit similar socio-cultural traits, each community considers itself a distinct ethno-linguistic group and inhabits its own legally demarcated territory. In this paper, 'Canela' refers only to the Ramkokamekra-Canela society.

The Canela refer to one species of bean as 'fava' in Portuguese, which would belong to Vicia faba, a genus that originated in the Levant (Hanelt and Mettin, 1989). It is as yet unclear if these beans are in fact a non-native species or if they are a slightly different variation within the Phaseolus genus which is native to the Americas. For the purposes of this article, this class of beans will be referred to as 'fava,' which according to the Canela are categorically distinct from the regular 'bean' varieties (feijão in Portuguese).

'Ancestors' is a rough translation of the Portuguese word bisavós (literally 'great-grandparents'), which the Canela use when referring to Canela historical or mythical figures, and often a combination of the two. Canela society does not have any form of ancestor worship or descent by lineage; thus, the term 'ancestor' should only be understood in this limited context.