

Electronic Thesis and Dissertation Repository

---

2-27-2015 12:00 AM

## Multi-method Exploration of the Economic Sustainability of Probiotic Yoghurt Kitchens in Mwanza, Tanzania

Emily Eyles

*The University of Western Ontario*

Supervisor

Isaac Luginaah

*The University of Western Ontario*

Graduate Program in Geography

A thesis submitted in partial fulfillment of the requirements for the degree in Master of Arts

© Emily Eyles 2015

Follow this and additional works at: <https://ir.lib.uwo.ca/etd>



Part of the [Human Geography Commons](#)

---

### Recommended Citation

Eyles, Emily, "Multi-method Exploration of the Economic Sustainability of Probiotic Yoghurt Kitchens in Mwanza, Tanzania" (2015). *Electronic Thesis and Dissertation Repository*. 2697.

<https://ir.lib.uwo.ca/etd/2697>

This Dissertation/Thesis is brought to you for free and open access by Scholarship@Western. It has been accepted for inclusion in Electronic Thesis and Dissertation Repository by an authorized administrator of Scholarship@Western. For more information, please contact [wlsadmin@uwo.ca](mailto:wlsadmin@uwo.ca).

«Multi-method Exploration of the Economic Sustainability of Probiotic Yoghurt  
Kitchens in Mwanza, Tanzania»

(Thesis format: Monograph)

by

Emily Catherine Eyles

Graduate Program in Geography

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Arts

The School of Graduate and Postdoctoral Studies  
The University of Western Ontario  
London, Ontario, Canada

© Emily Catherine Eyles 2015

## Abstract

This research aimed to examine the economic and locational aspects of a probiotic yoghurt kitchen development project facilitated by Western Heads East in Mwanza, Tanzania. This study is based upon 41 semi-structured interviews with 57 participants in three groups: kitchen group members, customers, and staff of the African Probiotic Yoghurt Network. This research contributes to the literature on development geography, specifically on the ins and outs of the everyday of the kitchens, as well as proposing a new approach to multicriteria evaluation using qualitative data, and the ‘researcher as instrument’ approach. The results demonstrate that while there are problems in the operation and communication of the kitchens and overseeing organization, this type of project should not be written off.

## Keywords

Tanzania, HIV/AIDS, economic geography, development, mixed methods, microenterprise

## Acknowledgments

I'd like to thank David Tibasima for his translation assistance in the field during interviews; the transcription and translation staff at the National Institute for Medical Research (NIMR) in Mwanza for their hard work; Dr. John Changalucha and Dr. Joseph Mwanga of NIMR for their far-reaching assistance in the field, especially their help with the city government; Dr. Isaac Luginaah for prompting me to take this journey and supervising my Master's, and Dr. Jacek Malczewski for invaluable assistance with the multicriteria evaluation methods. I'd also like to thank all of my colleagues from the Environmental Health and Hazards Lab for their help and support: Jenna, Andrea, Vincent, Sarah, Chad, Tor, Frederick, Caren, and Faith. I'd also like to thank Western Heads East for facilitating my research in Tanzania and the African Probiotic Yoghurt Network for their assistance and friendship. Finally, I'd like to thank the kitchen groups, their members, and their customers for their time and help.

# Table of Contents

Abstract.....	ii
Acknowledgments.....	iii
Table of Contents.....	iv
List of Tables.....	vii
List of Figures.....	ix
List of Equations.....	x
List of Appendices.....	xi
Chapter 1.....	1
1 Introduction and Context.....	1
1.1 Research Objectives.....	3
1.2 Disciplinary Context: ‘New’ Economic Geography.....	3
1.3 Community Profile.....	6
1.4 Organization of Thesis.....	12
Chapter 2.....	14
2 Literature Review.....	14
2.1 Gender and Development.....	14
2.2 Probiotic Yoghurt.....	18
2.3 Conclusion.....	19
Chapter 3.....	22
3 Methods.....	22
3.1 Study Design.....	22
3.2 Data Collection.....	25
3.2.1 Qualitative Data: Sampling Strategy.....	25
3.2.2 Qualitative Data: Interviews.....	26

3.2.3	Cartographic and Quantitative Data.....	27
3.3	Analysis.....	29
3.3.1	The Interviews .....	29
3.3.2	Multicriteria Evaluation and Decision-Making .....	30
3.4	Ethical Considerations and Limitations .....	42
3.5	Conclusion .....	44
Chapter 4	.....	46
4	Results .....	46
4.1	Context.....	46
4.2	Interview themes.....	47
4.2.1	Communication, Control, and Power.....	47
4.2.2	Meeting Project Goals.....	54
4.2.3	Making Money .....	57
4.2.4	Packaging of Probiotic Yoghurt.....	59
4.2.5	Marketing and Customer Feedback .....	61
4.2.6	Stigma on the Beneficiaries .....	66
4.2.7	Other Barriers to Economic Success.....	69
4.2.8	Conclusions.....	71
4.3	Multicriteria Evaluation .....	72
4.3.1	Ranking Objectives.....	72
4.3.2	Ranking Criteria.....	74
4.3.3	Standardised Attribute Values and Weights .....	79
4.3.4	Final Rating and Ranking .....	80
Chapter 5	.....	82
5	Discussion and Conclusions.....	82
5.1	Perceptions of Kitchens in the Context of Economic Sustainability .....	82

5.2 Multicriteria Evaluation and Locational Choices .....	91
5.3 Conclusions.....	93
5.4 Future Research .....	95
References.....	97
Appendices.....	113
Curriculum Vitae .....	123

## List of Tables

Table 1: Community profile of Mwanza, Tanzania in terms of population, health, and gender. Source a: Tanzanian Population and Household Census 2012 (TNBS 2014); b: Tanzanian Demographic and Health Survey 2010 (TNBS 2011). All statistics are for Mwanza region, except where indicated as Tanzania or Lake. Tanzania refers to the Tanzanian Mainland, inclusive of rural and urban areas; Lake refers to Kagera, Mwanza, and Mara regions combined.....	8
Table 2: Characteristics of APYN Probiotic Yoghurt Kitchens in Mwanza, Tanzania.....	12
Table 3: Scale for pairwise comparison (from Saaty 1980).....	36
Table 4: Pairwise comparison of objectives.....	73
Table 5: Objective weights.....	73
Table 6: Consistency ratio for objectives. Lambda = 4.10, CI= 0.03, CR = 0.04.....	73
Table 7: Pairwise comparison for criteria under costs.....	75
Table 8: Local weights for criteria under costs.....	75
Table 9: Consistency ratio. Lambda = 3.05 CR = 0.05 CI = 0.03.....	76
Tables 10: Pairwise comparison for criteria under profits.....	76
Table 11: Local weights for criteria under profits.....	77
Table 12: Consistency ratio with respect to profit criteria. Lambda = 2.00, CR = 0.00, CI = 0.00.....	77
Table 13: Pairwise comparison for criteria under size.....	78
Table 14: Local weights for criteria under size.....	78



Table 15: Consistency ratio with respect to size criteria. Lambda = 2.00, CR = 0.00, CI = 0.00.....78

Table 16: Pairwise comparison for criteria under accessibility.....79

Table 17: Local weights for criteria under accessibility.....79

Table 18: Consistency ratio with respect to accessibility criteria. Lambda = 2.00, CR = 0.00, CI = 0.00.....79

Table 19: Normalised values for evaluation. C1: Milk cost/L; C2: Rent/month; C3: Fuel/month; C4: Income/member/month; C5: Savings/month; C6: Customers/day; C7: Number of members; C8: Distance from a major/paved road; C9: Walking time to the nearest bus stand.....80

Table 20: Calculating global weights for each criterion.....80

Table 21: Final ranking of kitchens; C1: Milk cost/L; C2: Rent/month; C3: Fuel/month; C4: Income/member/month; C5: Savings/month; C6: Customers/day; C7: Number of members; C8: Distance from a major/paved road; C9: Walking time to the nearest bus stand.....81

## List of Figures

Figure 1: The location of Mwanza in Tanzania, adapted from Flynn (2005).....	6
Figure 2: a) Probiotic yoghurt kitchens within Mwanza, Tanzania; b) within the Mwanza region.....	8
Figure 3: Multicriteria Decision (or Evaluation) table (from Malczewski 1999).....	29
Figure 4: Hierarchy for multicriteria evaluation problem.....	42
Figure 5: Multicriteria evaluation hierarchy with global weights.....	72

## List of Equations

Equation 1: Formulae for ranking methods. A) Rank sum; B) Rank reciprocal; C) Rank Exponent. Variables: $w_j$ : the normalised weight for the $j$ -th criterion; $n$ : total number of criteria; $r_j$ : the rank position of the criterion (from Malczewski 1999).....	35
Equation 2: Consistency index formula (Malczewski 1999).....	37

## List of Appendices

Appendix 1: Ethical Approval.....	113
Appendix 2: Informed Consent and Letter of Information.....	114
Appendix 3: Research Assistant Confidentiality Agreement.....	117
Appendix 4: Interview Guides.....	118

## Chapter 1

### 1 Introduction and Context

Yoghurt kitchens are becoming increasingly prevalent in East Africa, many of them opened by groups of marginalized women, some impacted by the HIV/AIDS epidemic. These women are participating in the Western Heads East (WHE) project, which was launched in 2002, and formally began operations in 2004 in Mwanza, Tanzania (Wenner 2009). The African Probiotic Yogurt Network (APYN) is the NGO established in December 2011 with the help of the Kivulini Women's Rights Organisation in the Mwanza community as an umbrella organization for the yoghurt kitchens. Their goals are to provide advice and guidance, to facilitate quality control, and to assist with the opening of new kitchens by new kitchen groups (APYN 2013). APYN's stated goals are:

- “1. To assist in the establishment and sustainability of probiotic yoghurt community health projects (kitchens) including continual monitoring of quality control and APYN specified standards.*
- 2. To strengthen training and capacity of small groups (mainly women and youth) by providing the training and technology to economically empower women and youth through the production, sale and distribution of probiotic yoghurt.*
- 3. To improve community health for all, especially people living with HIV/AIDS, by supporting the production, distribution and sale of probiotic yoghurt.*
- 4. To create public awareness on the health benefits of probiotic yoghurt, and its relationship to poverty reduction and development.*
- 5. To link and partner groups, networks, and individuals to share experiences on community development, probiotic yoghurt production, business promotion, women's rights, marketing, trade, success, environmental sustainability and other related issues.” (APYN 2013)*

The program's goal of educating and training the kitchen groups on yogurt production is to help empower them and to also to improve the nutrition of the local population, particularly those suffering from HIV/AIDS (Wenner 2009). Despite the yogurt being good for general nutrition, the evidence also shows that probiotic yogurt is beneficial for people living with HIV/AIDS as it helps to minimize the effects of antiretroviral drugs (ARVs), improves CD4 immune response, and quality of life (Irvine et al 2010). The WHO/FAO (2002) recommends probiotics as a low-cost way of improving quality of life in areas susceptible to disease and malnutrition.

Given the beneficial effects of probiotics, several communities in Tanzania and other East African countries, including Kenya, Rwanda, Malawi, and Burundi, are currently in the process of setting up yogurt kitchens through WHE and other initiatives (e.g. World Bank projects; see also Sebele 2010). In Mwanza, Tanzania's second largest city, located on the shores of Lake Victoria, there are currently ten kitchens operating under the APYN umbrella. Despite numerous studies on the perceptions and the health benefits of probiotic yoghurt, what has not been examined is how women determine the location of their kitchens, and how this and other characteristics impact economic viability (see for example Whaling 2012). Economic activity is strongly linked to geographical space and time conceptualizations. Location is important, and despite other impediments to the formation of cohesive business and industrial networks, research has proven that it is one of the most important factors in success and viability (Krugman 1998). Yet the acquisition of land or rental space in many countries, especially for poor women may be challenging. For instance, land tenure is a major issue in Tanzania: with two differing schemes, i.e. right of occupancy granted by the state versus customary (private) land rights, locative choice may be more difficult, and land use planning often complicates the issue even further as land tenure continues to be formalised from the failed communal system (Nnkaya 2007). Furthermore, rent often has to be paid in six month to yearlong installments; WHE and APYN funds have covered initial payments to landlords, however, they do not cover any subsequent moves. In this context, analysing the decisions of the kitchen group workers requires an understanding of the complex challenges the women face in their everyday lives.

## 1.1 Research Objectives

The sustainability of some of these kitchens must be further examined. This may be related to the location of the kitchens themselves, but other factors should be considered. It is nonetheless important to understand the factors that determine the location of yogurt kitchens by resource poor women, so as to develop a better understanding for locating future probiotic yogurt kitchens, while also taking the opinions, desires and personal geographies of the women into account. This study will examine other issues that may prevent success such as the stigma surrounding HIV/AIDS patients and community perceptions of the kitchens, marketing and packaging, and communication strategies between APYN, kitchen groups, and WHE. This thesis has two specific objectives: to examine the perceptions of the probiotic yoghurt kitchens in the context of economic sustainability, and to examine the locational decision-making process. Therefore, the research questions are as follows:

1. What are the factors that contribute to the success of the kitchens and how might they be improved?
2. What barriers exist to achieving the project's goals?
3. What are the lessons, which can be applied to future, similar development projects?

## 1.2 Disciplinary Context: 'New' Economic Geography

This thesis is rooted in the geographic tradition – geography as a discipline is flexible and highly capable of answering these types of questions. Geographic research at its core addresses questions of location. It is important to note that, generally speaking, most contend with *relative* location. Location, which is fundamental to the human experience, includes spatial extension and its inner and outer characteristics and connectivities (Relph 1976). According to Relph (1976), places, then, are unique, interconnected entities that exist in space, which is amorphous and intangible, as all spaces become places once meaning is attached. Space, therefore, cannot be directly analysed, as it is shaped into place(s) by human experience and through human agency

(see Plummer and Sheppard 2006). Distance is fundamentally the reducible element of these issues: while the distance of location related to the destination is generally of utmost importance, the images and emotional attachments people form of other places diminish the significance of sheer physical distance alone (Gould and White 1986). Distance, then, as a concept, is not strictly physical, but strongly influenced by human agency. Places have meaning, and these are structured at multiple scales through human behaviour (Relph 1976). Social space and physical space are so tightly enmeshed that many do not distinguish between the two, and decisions are constantly being made through a filter, which reflects this (Gould and White 1986). Human behaviour can appear complicated, though it may be a case of a complex pathway rather than a complex goal, given that memory selectively retains sensory impressions of space, including barriers to access (Gould and White 1986). Sense of place therefore can be considered as a habit formed through perceptions of that which is already there (Relph 1976).

Furthermore, geography has often historically been concerned with answering questions of economy and development (see for example Livingstone 1992). Geography is pluralistic in terms of ontology and epistemology, allowing for a variety of approaches based in context, though this is not always without critique (see Barnett 1995). It is important too to recognise one's positionality in economic geography, in that researchers must ask themselves where they come from as an individual, how their arguments are constructed, and the particularities of the contexts in which research is conducted (Barnes 1996 cited in Kelly 2008).

Economic geography has, since its inception at the end of the 19<sup>th</sup> century, been strictly concerned with describing the places and spaces in which economic activities occur (Barnes 2009). Economic geography has continually reinvented itself since then: it now encompasses a plurality of ideas and methodologies. It is difficult to separate the economic from the social as economic geographers historically did; the economic is intertwined with the social (Thrift and Olds 1996). Lee (2010: 206) emphasised this, as "there is not, and cannot be, a separate economic and a separate social." The cultural turn in geography brought about new conceptual thinking and a broadening of economic geography; the economy was thought of "as a cultural product, fragile, performed, and



capable of realization in a variety of forms” (Barnes 2009, 180). The new economic geography features ‘a set of narrative communities in relation’ rather than a single narrative (Thrift and Olds 1996). Economic geography has become more inclusive and pluralistic, and this has made its approaches to research problems more robust than strict economics (Overman 2004). Spatiality and the geographical imagination must be taken seriously in examining the economic, and this has generally been widely accepted by economic geographers (Peck 2005, Lee 2010). The boundaries between economic geography and other subfields of geography have been muddied, and some have warned this may lead to a splintering of the discipline until it has no meaningful voice (Peck 2005). Despite this, Economic geographers have thus addressed a large variety of topics such as employment and health (Wight et al 2013, Cummins et al 2005), local economies in Tanzania and East Africa (Murphy 2003; Cali 2014; Söderbom et al 2006), evolutionary economic geography (Boschma and Hartog 2014; Martin 2012), and issues of gender (Nagar et al 2002; McDowell 2009; Dwyer 2013). This study engages with and contributes to research in economic geography by acknowledging the strong links between the economic, the social, and the cultural via its objectives: examining the perceptions of the probiotic yoghurt kitchens in the context of economic sustainability, and examining the locational decision-making process.

### 1.3 Community Profile



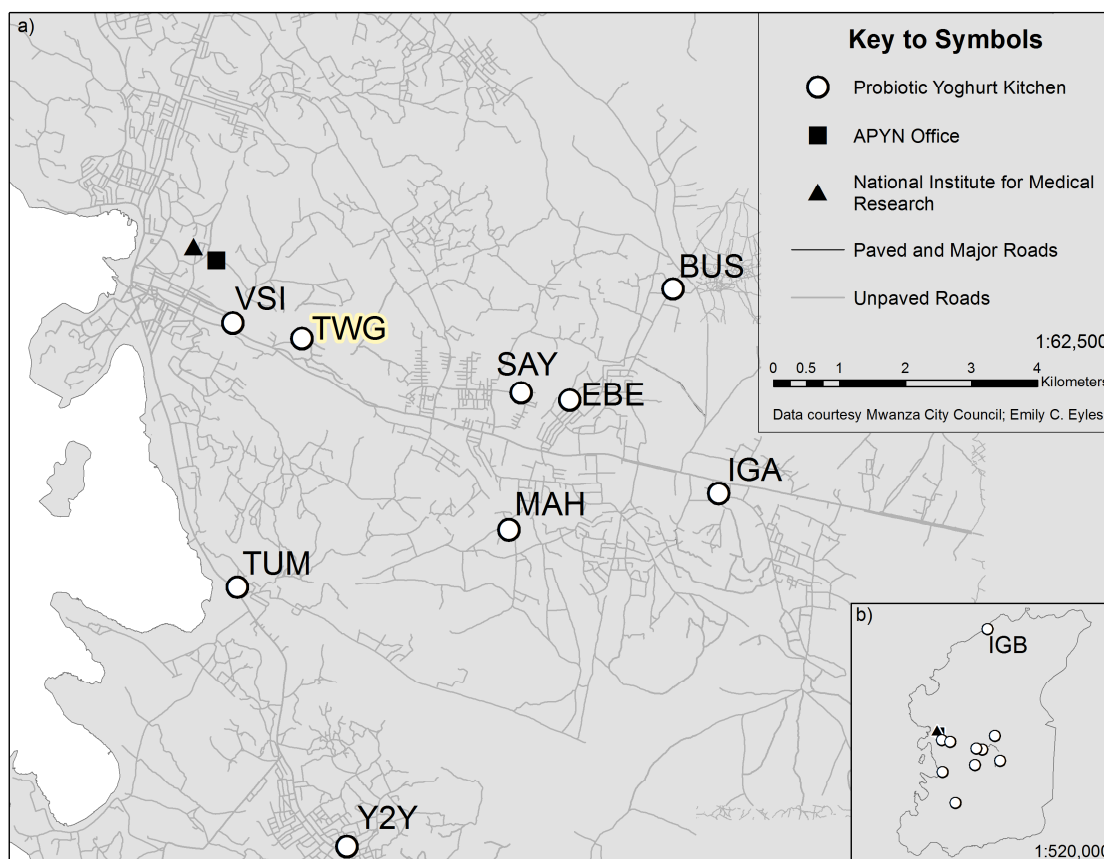
**Figure 1: The location of Mwanza in Tanzania, adapted from Flynn (2005)**

Mwanza, Tanzania, is Tanzania's second largest city, located on the southern shore of Lake Victoria. Figure 1 situates the Mwanza region in Tanzania, then the city of Mwanza within the region. The Mwanza region has a population of 2.77 million, containing 6.4% of the population, compared with Dar es Salaam, the capital, which contains 10% of the country's population (TNBS 2013a; see table 1 for more demographic information). The rate of HIV/AIDS in Tanzania is 5.1%, 7.0% in the mainland (i.e. Tanganyika) excluding Zanzibar (TNBS 2013b). The HIV rate in Mwanza is 4.2% as of 2010 (TNBS 2012). Women are more likely to be infected than men in Tanganyika; 6.8% of women are living with HIV/AIDS and 4.7% of men are (TNBS

2013b). While the rate has been in general decline, it is important to continue work towards helping those living with HIV/AIDS to maintain this success.

A factor in HIV/AIDS is malnutrition, which is a significant problem in Tanzania. 44% of Tanzanians were found to be energy deficient, and this affects both labour productivity and economic growth (World Bank, TFNC and UNICEF 2007). This can also contribute to time poverty. It was also found that there was little difference between the first four income quintiles in terms of malnutrition (World Bank, TFNC, and UNICEF 2007). Table 1 also provides a profile of health issues. Therefore increasing access to probiotic yoghurt, proven to reduce malnutrition and mitigate the effects of HIV/AIDS contributes to this goal (see section 3.2). WHE is a project that aims to help meet this national goal through the local supply of probiotic yoghurt.

The project has a few overarching goals: the primary goal is to fund daily doses of probiotic yoghurt to people living with HIV/AIDS, known as beneficiaries; the secondary goal of the project is to help economically empower resource-poor women and youth by providing them with a sustainable source of income, and ownership of a business. There are ten probiotic yoghurt kitchens operating under the WHE program, administered by a local group called the African Probiotic Yoghurt Network (APYN). The ten kitchens are Tukwamuane (TWG), Tumaini (TUM), Sayuni (SAY), Igoma (IGA), Igombe (IGB), Buswelu (BUS), Ebeneza (EBE), Youth2Youth (Y2Y), VSI, and Mahina (MAH). Figure 2 locates each kitchen in Mwanza, as well as the offices of the National Institute for Medical Research, where the probiotic is manufactured, and the office of the African Probiotic Yoghurt Network (APYN). Each kitchen receives funding for 75 beneficiaries (people living with HIV/AIDS), who are given one free serving of yoghurt daily, but funding is soon to end.



**Figure 2: a) Probiotic yoghurt kitchens within Mwanza, Tanzania; b) within the Mwanza region**

**Table 1: Community profile of Mwanza, Tanzania in terms of population, health, and gender. Source a: Tanzanian Population and Household Census 2012 (TNBS 2014); b: Tanzanian Demographic and Health Survey 2010 (TNBS 2011). All statistics are for Mwanza region, except where indicated as Tanzania or Lake. Tanzania refers to the Tanzanian Mainland, inclusive of rural and urban areas; Lake refers to Kagera, Mwanza, and Mara regions combined.**

Characteristics	Male	Female	Total
Population	1,360,381	1,412,128	2,772,509
Number of households <sup>a</sup>	-	-	486,166
Average household size <sup>a</sup>	-	-	5.7
Sex Ratio <sup>a</sup>	-	-	96
Female-headed households (%) <sup>a</sup>	-	-	33.2

Households with electricity (%) <sup>a</sup>		-	-	24.1	
Households with piped water (%) <sup>a</sup>		-	-	32.4	
Households with no toilet facility (%) <sup>a</sup>		-	-	8.8	
Education <sup>b</sup>	No education (%)	14.0	20.0	-	
	Some Primary (%)	21.7	23.6	-	
	Completed Primary (%)	42.7	42.3	-	
	Secondary and Higher (%)	21.5	14.1	-	
	Median Years Completed (%)	6.3	6.2	-	
Work <sup>b</sup>	Currently employed (%)	79.4	82.3	-	
	Not currently employed (%)	20.6	17.7	-	
	Employed in skilled/unskilled manual labour (%)	8.2/8.5	6.9/9.5	-	
	Employed in agriculture (%)	68.7	75.7	-	
Health <sup>b</sup>	Age-Standardised Mortality Rate (Tanzania)	5.0	5.1	-	
	Total Fertility Rate (Lake)	-	6.3	-	
	Mean number of children ever born to women 40-49 (Lake)	-	7.0	-	
	HIV/AIDS rate (Tanzania)	-	-	5.1	
	HIV/AIDS rate	-	-	4.2	
	Heard of HIV/AIDS (%)	99.8	99.9	-	
	Tested for HIV/AIDS (%)	33.7	50.6	-	
	No health insurance (%)	95.7	93.7	-	
Gender: Women (15-49) <sup>b</sup>	Facing problems accessing healthcare (%)	Getting permission	-	2.3	-
		Getting money	-	18.4	-
		Travel distance	-	14.8	-
		Not wanting to go alone	-	5.2	-

		At least one problem	-	31.5	-
with experience of (%)		Sexual violence	-	24.5	-
		Physical violence	-	43.6	-
Married women's cash earnings (%)	Person who decides how earnings are used	Wife	-	(34.0)	-
		Jointly	-	(58.8)	-
		Husband	-	(7.3)	-
		Wife earns more	-	(9.6)	-
		Wife earns less	-	(86.2)	-
		Wife earns the same	-	(2.2)	-
	Married women's participation in decision-making about		Own healthcare	-	44.4
		Major household purchases	-	21.1	-
		Visits to her relatives	-	28.6	-
		All above decisions	-	11.3	-
		None of the above decisions	-	43.9	-
Attitudes towards when wife beating is appropriate if she		Burns food	-	19.0	-
		Argues with her husband	-	43.9	-
		Goes out without telling her husband	-	46.9	-
		Neglects the children	-	46.4	-
		Refuses to have sex	-	35.8	-
		Agree with at least one above reason	-	67.0	-

The kitchens vary in terms of location and characteristics (see figure 2 for their locations in Mwanza). Tukwamuane (TWG) is located fairly close to the city centre in Mabatini, close to a school, and within a short walk of a bus stand. It has one large room,

which is painted with murals relating to the project, featuring several indoor seats and a fairly large, clean, organised kitchen area with worktops and cupboards. Tumaini (TUM) is located in Mkolani, down a small alleyway off the main (dirt) road, and within a very

Kitchen	Members (#)	Income (/member /month)	Savings (tsh/mo)	Milk Price (tsh/L)	Rent (tsh/mo)	Fuel (tsh/mo), charcoal or gas	Customers /day	Distance from paved/major road (metres)	Walking time to closest bus stand
---------	-------------	-------------------------	------------------	--------------------	---------------	--------------------------------	----------------	---	-----------------------------------

short walk of the local bus stand. Mkolani is on the main road (Kenyatta Road) towards the university and Shinyanga. It has two smallish rooms with very little seating, though it is very clean. Sayuni (SAY) is located in Nyakato Mecco, close to a Saccos (microloan branch), and at the end of a market area. Nyakato Mecco is off the main road (Nyerere Road) towards Mbeya. Sayuni has two relatively large, clean rooms, generous amounts of seating, and the kitchen group has built worktops (unlike most other kitchens). Igoma (IGA) is located in the area of the same name, a short walk from a nearby bus stand. Igoma is farther along the Nyerere Road than Sayuni. It has two average rooms, and can be a bit dusty, though mostly clean, and has several indoor seats. Igombe (IGB) is located the farthest away from the city centre. It is approximately eight kilometres from the airport. The kitchen has one small, clean room with some indoor and outdoor seating, and is located in the town of the same name on the lakeshore. Buswelu (BUS) is located by a town of the same name fairly far off the Nyerere Road. It is a small, dusty room, owing to the grain mill nearby, which may cause some issues with the taste of their yoghurt. There is not really any customer seating. Ebeneza (EBE) is located in Nyakato National, close to a bus stand down the Nyerere Road from Nyakato Mecco. It is next to a school, and has two small, tidy rooms with some indoor seating. Youth2Youth is located by the Nyegezi bus stand on the Kenyatta Road. The Nyegezi bus stand is probably the largest in Mwanza, and features intercity buses. It has two large, clean rooms with some indoor seating. VSI is located by Mlango Mmoja, a large used clothes market on the Nyerere Road, and is the closest kitchen to the city centre.

**Table 2: Characteristics of APYN Probiotic Yoghurt Kitchens in Mwanza, Tanzania**

TWG	7	100000	200000	1000	50000	30000	320	39.10	7
TUM	5	160000	0	800	50000	35000	160	43.54	2
SAY	7	85000	100000	850	60000	45000	160	444.43	10
IGA	5	100000	150000	850	120000	40000	160	182.80	4
IGB	5	100000	150000	1000	50000	30000	120	8893.38	2
BUS	11	45000	0	1000	50000	70000	100	633.60	45
EBE	5	80000	150000	820	100000	86000	160	839.53	15
Y2Y	5	60000	40000	800	70000	30000	100	93.58	4
VSI	10	20000	0	800	60000	110000	120	2.91	4
MAH	4	0	0	850	20000	30000	0	1266.70	65

## 1.4 Organization of Thesis

This thesis includes five chapters, including this chapter, which introduces the context of this study and provides a community profile, as well as stating the research objectives and research questions. Chapter 2 extends the background to the research by overviewing probiotic yoghurt and the Western Heads East project, as well as placing the study in the context of the literature, particularly that of gender and development.

Chapter 3 outlines the study design, particularly its specific ontologico-epistemological approach and its methodological framework. It also describes the data collection process in the field and the analytical processes by method type (i.e. qualitative data collection versus quantitative data collection). Chapter 3 also examines multicriteria evaluation and explains the methods behind examining decision-making processes, situating them in a geographical context. I also reflect on ethical considerations, such as confidentiality and conducting cross-cultural research, and the limitations to the methodological framework of this study.

The study findings are presented in Chapter 4. The results are centred around the research objectives, namely examining the perceptions of the probiotic yoghurt kitchens in the context of economic sustainability (4.2), and examining the locational decision-making processes (4.3). The interview data is presented in terms of thematic categories,



including communication, project goals, and barriers to success. The multicriteria evaluation is demonstrated step by step, and each decision explained for the sake of transparency.

Chapter 5 discusses the results in the context of the research objectives. This chapter also presents the contributions of the research to the field of geography, as well as recommendations for the Western Heads East project in terms of economic sustainability and success. It concludes the study, and presents areas for future research both in the context of Western Heads East, as well as in economic geography as a sub-field.

Appendices include the ethical approval granted by the University of Western Ontario, letters of information and consent forms, research assistant confidentiality forms, and the interview guides.

## Chapter 2

### 2 Literature Review

This chapter examines the existing literature around gender and development, probiotic yoghurt and the Western Heads East/African Probiotic Yoghurt Network projects.

#### 2.1 Gender and Development

Development is a context specific, continuous, cumulative process, though it is important to note that the changes it may produce are not always positive (Chant and McIlwane 2009). Gender and development (GAD) is a holistic approach developed primarily by feminist scholars, where the historico-political and socio-economic influences on gender are recognised and accounted for in development programmes (Moser 1993; Momsen 2004; Beneria 2003; Mohanty, Russo and Torres 1991; Kothari and Minogue 2002; Baden and Goetz 1997). Gender is a social complex. It is constantly being constructed through social interactions across space and time. Gender is mutable and constantly in flux: GAD projects attempt to act on these processes to meet what Moser (1993) termed practical and strategic “gender needs.” Practical gender needs are immediate, material, and pertain to domestic or community services, and meeting them tends to benefit at the individual, household, and immediate community scales (Moser 1993; Chant and McIlwane 2009). Strategic gender needs are more difficult to reconcile, and exist primarily at the societal scale. They vary according to context, and they are identified because of women’s subordinate position to men in their society (Moser 1993). In essence, to meet strategic gender needs is to take steps towards a gender-equal society and to change the roles of women (Chant and McIlwane 2009; Beneria 2003). Examples of strategic gender needs include domestic violence, gendered divisions of labour, and women’s bodily autonomy (Moser 1993).

Gender and development has been acknowledged by mainstream development agencies through the concept of ‘gender mainstreaming’ (e.g. UNODC 2013; World Bank 2011; WHO 2009; Beall 1998). Gender mainstreaming attempts to explicitly take

gender into account throughout the policy process (Baden and Gotez 1997). There can be issues, however, with this type of approach. Firstly, many of the underlying assumptions, such as equitable household division of resources, remain despite the change in approach (Cornwall 2003; Razavi and Staab 2010). Often agencies may use the ‘add women and stir’ tactic, without accounting for context at all scales which can include preferences, differences in ability to make choices, and the role of the market (Beneria 2003; Langevang and Gough 2012). Moser and Moser (2005) also noted that attempts to integrate gender mainstreaming in international institutions was patchy. Furthermore, meeting practical needs may not directly confront inequality, though it may become transformative and empowering for the women involved (Beneria 2003). But it is only empowering for those involved, and not for others throughout society: the impetus towards the objectives of GAD can be lost in individual advancement for a selected few rather than creating collective progress (Beneria 2003).

This can be attributed in part to the ‘integrationist’ approach to gender mainstreaming in development, which does not directly nor explicitly contest existing policy goals and paradigms (Walby 2005). Cornwall and Brock (2005) discuss the use of buzzwords in policy, specifically ‘participation,’ ‘empowerment,’ and ‘poverty reduction,’ and how they are used by international development agencies to convey legitimacy and moral authority. These buzzwords, like gender or GAD itself, can be used in pursuit of certain narratives of development as opposed to embracing them wholeheartedly, as some organisations only partially take up these concepts (Cornwall and Brock 2005). Feminist terms like ‘gender and development’ or ‘gender mainstreaming’ have been depoliticised and made effectively neutral and pragmatic (Cornwall and Brock 2005, Smyth 2007). There is “bland talk of ‘gender’” in development bureaucracies, and an obvious silence around ‘feminism,’ as many of these organisations are not willing to make fundamental transformations and are content with the ‘add women and stir’ approach (Smyth 2007). There is a strong emphasis on measurability in gender policy goals, but this is difficult when empowerment is a process, and not an end product (Smyth 2007, Rao 2006). Rao (2006) emphasises that measurement is not necessarily the problem, but that better measures of intangibles must be developed in order to continue gender-based development.

By not explicitly challenging policy and using buzzwords to convey legitimacy, the 'integrationist' approach can exacerbate negative gender roles and paradigms. Gender mainstreaming, then, has not successfully addressed issues raised by feminists (Smyth 2007). Good intentions can be spoiled by bureaucracies: "while the intention of gender mainstreaming is transformation, it has been chewed up and spit out by development bureaucracies in forms that feminists would barely recognize" (Rao 2006). Smyth (2007) has also remarked that gender mainstreaming has reduced resources devoted to women specifically, as gender has been 'mainstreamed.' There is, then, according to some, no point in addressing gender needs specifically if they have been mainstreamed, but this can reinforce negative roles for women (Smyth 2007).

Moser (1993) writes of women's three roles, i.e. the reproductive, the productive, and the community managing. The reproductive role consists of the vast majority of domestic tasks, and is not exclusive of biological reproduction; the maintenance of the current and future workforce is allocated a significant amount of time, but is nonetheless not considered 'real' work (Moser 1993; Kabeer 2003). The productive role is generally considered as any work that produces any sort of exchange or use value, such as agricultural labour or home production (Moser 1993; Beneria 2003). The community managing role is voluntary, and is not a political role, as those roles are compensated either financially or with power; community managing roles aid in the provision of items of collective, social, or cultural consumption (Moser 1993; Momsen 2004). Women's labour is generally viewed as less valuable in sub-Saharan African countries, and these roles are not all taken into consideration by development agencies and society at large (Kevane 2004). As women work more and more, their time burden increases, acting as a constraint on their engaging with development projects (Momsen 2004; Wodon and Blackden 2006). Women's various duties compound on each other as they are not performed sequentially but simultaneously (see Moser 1993; Wodon and Blackden 2006). The social dynamics which govern how constraints on how women operate in the labour market must be acknowledged, as even the market itself embodies and transmits gender inequalities, systematically disadvantaging women, even when there are little to no constraints on market participation itself (Meagher 2010). The difference here is necessity versus choice in employment (Langevang and Gough 2012).

Exacerbating this, women's work tends to be relatively insecure, as it is predominantly informal, like the majority of employment in sub-Saharan Africa (Kabeer 2010; World Bank 2007; Chan 2010; Barrientos and Kabeer 2004). Most of those in the informal category are women: 84% of employed women are in the informal, non-agricultural sector, versus 63% of men (Chan 2010)." Informal labour has become feminised (Meagher 2010). Work in the developing world does tend to be segmented by gender, and women's pay is almost always lower than that of men in equivalent professions, however Kabeer (2010:47) notes that women "do not monopolise the worst paid jobs in the economy but they are over-represented in them." Individual choice in work should therefore also be considered along with outside support. Gender divisions of labour are historically and geographically contingent, and it must be reinforced that the right to work does not necessarily bear on the right to the profits of one's labour (Friedberg 2001). Informal work contributes to poverty risk, as jobs tend to be low skill, low income, with little prospect for advancement; the poor cannot merely work hard to get out of poverty (Chan 2010; Meagher 2010). Therefore, development projects should be careful not to reinforce the structure of women's work with informal, low-skill work.

A large amount of informally employed women are paid contributing members of cooperatives or producer groups such as Western Heads East (WHE) (Chan 2010). This is not a problem in and of itself; however, there is a distinct absence of lucrative informal opportunities: women tend to be placed in a narrow range of progressively saturated low income activities such as food preparation (Meagher 2010). Clearly then, women's work tends to be deskilled, and this range of activity reproduces stereotypical gender roles, reinforcing current norms, and therefore does not always reflect gender-based development goals, even if they claim to be (i.e. the integrationist approach, see Creighton and Omari 2000). Despite the range of women's informal employment, entrepreneurship and informal microenterprises are seen as a solution to underemployment, though it is important to consider the conditions under which they are practiced (Langevang and Gough 2012; Barrientos and Kabeer 2004). Institutions and interventions are important in this process, but should avoid creating dependency (Langevang and Gough 2012; Moss, Pettersson and van de Walle 2006).

Furthermore, men must be considered in any gender-based development project. Men are not merely obstacles in the quest for gender equality, but people, who may be considered as allies (Cornwall 2000). The most common model of leadership in Tanzania is communal, where a leader or elder often represents the group's decisions and facilitates discussion (Kirk and Shutte 2004). However, working with male elders may, in effect, cause detriment to the strategic gender elements of the project, as such collaboration could end up being collusion with hegemonic gender norms (Cornwall 2000). Power is contingent, and often those holding power, who generally are supported by such norms, act in ways which would disrupt their changing. This is reflected in the prevalence of spousal violence in Tanzania, as abusive behaviour is sometimes a response to a fear of losing control and dominance over women (Creighton and Omari 2000; Baylies and Bujra 2000). Further, while women's responsibilities outside the home increase, men do not generally take up larger shares of (unpaid) household work to help ease the burden of multiple spheres of work (Kabeer 2010). Women in sub-Saharan Africa are disproportionately time-poor due to their multiple, simultaneous responsibilities, and further may spend significant amounts of time in transit between these, impacting their feelings on adding yet another responsibility such as development work (Wodon and Blackden 2006). While women's equality and empowerment has long been on the agenda in Tanzania, women there nonetheless experience socio-economic and political disempowerment, making little progress against unequal access to opportunities (Creighton and Omari 1995; Creighton and Omari 2000; Kevane 2004).

## 2.2 Probiotic Yoghurt

Nutritional interventions have become increasingly important as a part of HIV/AIDS management (Tomkins 2005). Nutritional supplements have been found, for example, to delay the progression of AIDS in HIV-infected patients (see Namulemia, Sparling, and Foster 2007). Probiotic yogurt consumption, for example, has been encouraged by the World Health Organisation and the Food and Agriculture Organisation of the United Nations (2002) as a low cost way of improving quality of life in areas susceptible to disease and malnutrition. Some strains of probiotic bacteria in particular have been found to minimize the negative effects of the ARVs used to treat HIV, to improve immune

response, and to expand general quality of life (capability) (Irvine et al. 2010). Probiotics have been found to modulate aspects of both natural and acquired immune responses as well as enhancing natural immunity (Gill and Guarner 2004). Furthermore, consumers of probiotic yogurt in Mwanza, Tanzania, reported an ability to work longer, less fever and stomach pain (a side effect of ARVs), and the achievement of daily nutrient requirements (Irvine et al. 2010; Irvine, Hummelen, and Hekmat 2011; Dols et al. 2011; Anukam et al. 2008). Whaling et al. (2012) have corroborated this through participant interviews, but though also have warned that there may be misconceptions as to its role in practice (as a medicine rather than a supplement, for example).

Reid (2010) argued that probiotic yogurt could be produced in the poorer regions of the world, based in part on the evidence provided by the Western Heads East (WHE) program at the University of Western Ontario. Wenner (2009) described the program as both empowering local women, and helping those HIV-infected individuals within the Mwanza community.

However, probiotic yogurt was posited by Hummelen et al. (2011) to be an unsustainable long-term intervention for those living far from distribution centres where live culturing is viable. Thus, in their study of probiotic supplementation in Nigeria using capsules of the culture (rather than the live cultures used in Mwanza) proved this pathway to be ultimately ineffective. The problem of location, then, is important, and must be considered in any probiotics program. A grassroots approach, i.e., one starting from community groups, has been suggested to be the most effective way to distribute probiotic products: community based kitchens as in the WHE program (Anukam and Reid 2005).

## 2.3 Conclusion

To solve decision problems, a variety of methods may be employed, particularly if the problem features more than one criteria (multicriteria evaluation). Several of these were detailed, including the analytic hierarchy process (AHP), which provides a rational

framework for group decision-making. Ideally, a GIS-based approach will be used to generate a decision surface of ideal kitchen locations, however, due to a lack of appropriate GIS data, AHP will be employed to determine the ideal kitchen out of the ten open in summer 2013. MCE can be used to provide an understanding of how decisions on the location of probiotic yoghurt kitchens and other attributes influence the success of these kitchens, based on a set of preferences defined by the researcher-as-instrument of the participants.

The gender and development (GAD) approach seeks to meet practical (immediate, material, domestic/community service) and, more importantly, strategic (gender equality, societal level) needs. Gender mainstreaming, though partly to underlying assumptions, is a development strategy that incorporates parts of the GAD approach. However, 'add women and stir' integrationism can perpetuate gender stereotypes and ignore inequalities while nonetheless meeting practical gender needs. It is important to consider the context of any project, especially the roles of women. These roles are threefold: productive (labour), reproductive (birth and childcare), and community managing (apolitically). In Tanzania in particular, women's roles in labour tend to be informal as their labour is generally less valued, leading to work that is low in skill and income. Juggling all of these roles leads to time poverty. Some development projects reproduce these roles as they provide work that reinforces gender norms, such as work in food production, and this may make dependency difficult to avoid. The APYN/WHE project must work hard to avoid this, though as each kitchen is collectively owned by its members, this may not be a significant problem.

The APYN/WHE project's primary goal is to provide a daily dose of probiotic yoghurt free of charge to those suffering from HIV/AIDS, though as funds are limited, only 75 beneficiaries per kitchen receive yoghurt. Several studies have concluded that this variety of probiotic bacteria (GR-1) provides tangible health benefits to people living with HI\*V/AIDS (see Irvine et al. 2010; Irvine, Hummelen, and Hekmat 2011; Dols et al. 2011; Anukam et al. 2008). The project's secondary goal is to provide a sustainable source of income and a business to resource-poor women and youth, as the yoghurt is available for purchase by the general population. As the kitchens become self-sustaining,



the idea is that the collectives will be able to provide the yoghurt to the beneficiaries using their own funds. The purpose of this thesis is to determine: 1. What are the factors that contribute to the success of the kitchens and how might they be improved? 2. What barriers exist to achieving the project's goals? 3. What are the lessons which can be applied to future, similar development projects? Relative location, and the social and physical spaces the kitchens inhabit are important in addressing these research questions. The sensory impressions of these spaces can include or form barriers to access. Subjectivities are inherent in issues involving people, especially decision problems.

## Chapter 3

### 3 Methods

The Western Heads East (WHE) probiotic yoghurt development project has two goals, the foremost of which being the administration of a probiotic yoghurt containing a beneficial type of bacteria to those living with HIV/AIDS in kitchens around Mwanza, Tanzania. This goal is relatively straightforward, and a fairly significant amount of work has been conducted on the positive health impacts of this program (see for example Irvine et al. 2010; Irvine, Hummelen, and Hekmat 2011; Dols et al. 2011; Anukam et al. 2008). The secondary goal of the project is to economically empower resource poor women's groups. This goal is considerably more complicated, yet very little has been written either describing or critiquing the project's impacts on women's empowerment (Anukam and Reid 2005 very briefly mention women's empowerment, as does Wenner 2009). The objectives of this research are therefore to examine the economic sustainability of the kitchens and factors towards success, as well as the participants' thoughts on this matter; to examine barriers to achieving the project's goals; to understand the locational choices and personal geographies of the participants and how these impact decision-making; to determine the characteristics of successful versus unsuccessful yoghurt kitchens, and to suggest ways in which the WHE project can be improved, and finally, to determine the lessons which can be applied to future, similar development projects. Due to the diversity of objectives, a mixed methods approach was employed. Firstly, this chapter will briefly describe the context and study design. Thereafter, the data collection strategies, including sampling will be explained and justified for each method. Analytic methods will then be described, followed by a discussion of how each relates to the other. To conclude, ethical issues and limitations will be reviewed.

#### 3.1 Study Design

The study design was influenced by a combination of ontologico-epistemological approaches, namely feminism, meta-modernism, and post-structuralism. Feminism is in

its nature pluralistic, and tends to incorporate pieces from other approaches (Johnston and Sidaway 2004). Metamodernism, a mutation of postmodernism of many names, reflects the growing trend in study design: a focus on the recipient of the text (or participant) rather than the author (or researcher) (Kirby, 2006). Kirby (2006) terms it 'pseudomodernism', and states that it includes "all 'texts' whose content and dynamics are invented or directed by the participating viewer or listener (although these latter terms, with their passivity and emphasis on reception, are obsolete)." Many contemporary research approaches focus on the participant as the ultimate knowledge generator; the existence of the research and its produced knowledge are totally dependent on the participants, and in a sense, cannot exist without them. Therefore, this research was designed to rely on the indirect influence of participants, using the metamodernistic strategy of making sense rather than creating meaning (Vermeulen and van den Akker 2010). In essence, the "epistemological priority which feminism has located in the personal, the subjective, the body, the symptomatic, the quotidian as the very site of the material inscription by the ideological" reinforces the importance of such an analytic strategy (Rose, 2002). Following this, the in-depth interview can be thought of as a conversation; interviews are embodied, emotional experiences, and this cannot be ignored in conducting them (Miller and Crabtree 2004; Ezzy 2010). Further, the interviewer is a research instrument as well, due to direct participation in the data collection and analysis (Oakley 2003). It is important to be forthright about the affect the researcher has on this study; the researcher and the research participant create meaning within their interactions, and there is no conflict in the truths that are revealed (Brodsky 2008). Building relationships with participants is important, and empathetically participating in the everyday of the research participants while observing, listening, questioning, and reflecting allows the researcher to (partially) experience that which is studied (Brodsky 2008, Berg 2008).

Therefore, continual, critical self-reflection and reassessment of the research is necessary in order to attempt to encompass the situated knowledges of varied subjects (Winchester and Roge 2010, England 1993; Barnes 1996). Representing the situatedness of knowledge is important, as without it, research may begin to feed on itself rather than absorbing or producing new and practicable information (King 2002). It is difficult,

though, to adequately represent these knowledges due to my own differing positionality, though one should expect it to reveal itself through my writing, or rather my text (Johnston and Sidaway 2004). Texts under the post-structuralist model are cultural products, which have a certain degree of fixity to many parts of social life, illustrate the wider context of composition, and are therefore party to a range of interpretations (Johnston and Sidaway 2004). Texts are constructed and read through the framework of discourse, where meanings are located; metaphors are devices to reproduce and transmit meaning (Johnston and Sidaway 2004). However, by describing what is unknown using the vocabulary of what is known, metaphors ensure a certain degree of instability in the transmission of meanings and the reproduction of knowledge (Johnston and Sidaway 2004). All of this is grounded in context.

Context is everything. Geography as a discipline emphasises the importance of space and place. Doing research in an unfamiliar, culturally distinct location meant that the study had to be designed with such a mixed, exploratory approach, and this carried through to the methods employed. A mixed methods approach was taken, using the semi-structured interview, and multicriteria evaluation (MCE). Methodological triangulation promotes trustworthiness in research findings, and hopefully will allow for the positionalities and experiences of the participants to be drawn out (Baxter and Eyles 1997).

In-depth interviewing is an approach to conducting an interview in which the narrative is emphasized, and the complex roles of both interviewer and interviewee come into play (Miller and Crabtree 2004). While the interview itself is a research instrument, through this paradigm, the researcher is also a research instrument, by way of her direct participation in the data (Oakley 2003). This is particularly true for the multicriteria evaluation, as expert participation in the evaluation is based predominantly in the knowledge derived from the interviews and conversations had from the participants. The value judgments made in multicriteria evaluation are those of the participants channeled through the researcher. In a sense, the in-depth interview can be reframed as a conversation, as many are wont to do (Miller and Crabtree 2004; Oakley 2003). This does not mean that qualitative interview work lacks rigour. Using the principle of thematic

saturation described in Baxter and Eyles (1997), interviews hypothetically are conducted until the talk of the desired theme reaches a point at which information is constantly repeated. This is generally how many of the interviews went – talk was exhausted more readily when interviewing the customers, for example, as the themes discussed were more limited, pertaining mostly to the kitchen, product, and amenities. The conversation lasted longer when discussing themes that are more complex. Furthermore, rigour should be considered an evaluative process involving transparency at each stage of research (Baxter and Eyles 1997).

The in-depth interviews can be used to help in assessing preferences in the multi-criteria evaluation procedure. As pairwise comparison was employed to evaluate the criteria, and the number of comparisons was relatively high (468 comparisons), the interviews were structured to give information about the various criteria examined in the analysis, in order to avoid undue stress on the participants. The researcher then used this data to evaluate the preferences for each criterion and subcriterion in the MCE. Some were more simple than others, depending on the level of the hierarchy (see figure 3) – maximising profit when comparing alternatives is an obvious choice, whereas deciding the relative importance of subcriteria, such as monthly income per member versus net monthly profit is more difficult. The project's goals and comments by APYN staff and kitchen members were helpful in determining these preferences. This was a reflective, thoughtful process.

## 3.2 Data Collection

The majority of data were collected in Mwanza, Tanzania between April 2013 and August 2013. Additional quantitative data were obtained in the winter of 2013 from the Tanzanian National Bureau of Statistics.

### 3.2.1 Qualitative Data: Sampling Strategy

The initial sampling strategy for this research was to attempt to capture everyone, by talking to every Yoghurt Mama, every APYN staff member, and at least four or five customers per kitchen. However, practicability dictated a combined opportunistic/snowball sampling method. By talking to as many different people involved

as possible, cases can be produced which challenge or disconfirm assumptions (Bradshaw and Stratford 2010). Therefore, recruitment became a site-based endeavour (see Arcurcy and Quandt 1999). In recruiting Yoghurt Mamas, the researcher visited each kitchen site and asked them firstly whether they would be willing to participate in the project, and secondly which day and time would be best to conduct the interviews. The researcher returned with a translator on the set day and interviewed which Yoghurt Mamas were on site at the time, which meant that some potential participants were excluded. In some cases, participants were asked by their colleagues to come to be interviewed. APYN staff were informed of the researcher's intent to ask them to participate in the research, and then times were scheduled. One staff member was not interviewed due to maternity leave. Customer recruitment was a combination of opportunistic and snowball sampling, depending on the case. A time was scheduled with four of the kitchens in order to sit and wait for customers willing to participate in the research. Some of the kitchens informed customers ahead of time and had them waiting, while others did not.

### 3.2.2 Qualitative Data: Interviews

The first part of the qualitative data consists of recorded interviews and their respective transcripts conducted in either Swahili (with translation assistance) or English. The interviews (interviews = 41, participants n= 57) were administered with three separate groups: those working in the yoghurt kitchens, sometimes known as “Yoghurt Mamas” (n= 27); customers of the yoghurt kitchens (n= 20), and the administrative personnel of the African Probiotic Yoghurt Network (APYN) (n= 5). While many of the interviews were one-on-one, several participants expressed increased comfort for interviewing with colleagues, so several of the interviews with the yoghurt producers were in such groups. A translator accompanied me to the interviews, which were conducted either at the kitchen in which the producer worked or the consumer attended, or at the APYN office. The translator explained the process of informed consent using the Western Ethics approved letter to the participants (see Appendix 2). After explaining the research, signatures were obtained for the consent form. The translator also signed a research confidentiality agreement (see Appendix 3). In three cases, the translator acquired verbal consent on the recording, as the participants could not read or write. The

interview guide was reviewed with the translator prior to each interview session (see Appendix 4 for interview guides). The translator translated my verbal questions into Swahili from English, and then the answers were reported from Swahili to English. A conversational, semi-structured style of interview was pursued in order to foster understanding of participants' experiences and views.

The interviews, which were conducted in Swahili, were later transcribed and translated by employees of the Mwanza branch of the National Institute for Medical Research (NIMR). I transcribed the interviews conducted in English.

### 3.2.3 Cartographic and Quantitative Data

The collection of data for the multicriteria evaluation (MCE) was complicated for a number of reasons. The kitchen location data, at least, was straightforward, and I collected approximately 10 points per kitchen location per visit ( $n$ =approximately 500) to ensure accuracy using a Garmin GPS. The data were converted to ArcGIS format using the convert to shapefile function. The base data was considerably more difficult to obtain. With the assistance of a local researcher at NIMR, Dr. Joseph Mwanga, the Mwanza City Council was contacted, first through a letter submitted requesting the data. When a follow-up visit was conducted to ascertain whether we were permitted to obtain data from the City, we discovered that our letter had not been forwarded to the relevant official (in this case, the City Planner). After some effort, we met with the City Director who ensured that our letter was forwarded, and then met with the City Planner the next day. Unfortunately, the cartographer did not give me the right type of file (an .mxd, which is a 'container' for other types of data, but does not contain the data itself), so I had to return to the office later the same day. I was allowed to sit at the computer in the Cartographic Department and take what data I required. I obtained the following datasets: roads, building outlines, blocks, satellite imagery, and city/neighbourhood boundaries. The City Planner later emailed me a PDF file with land use data maps.

Other data, such as population, income, and HIV/AIDS status was obtained from the 2012 Tanzanian National Census, the 2010 Tanzanian Demographic and Health Survey, and the 2013 National HIV/AIDS Survey (TNBS 2011, 2013a, 2013b).

Data on kitchen expenses were obtained through the kind generosity of Kate Grantham, PhD candidate in women's studies, who was conducting her thesis work with the same population.

The multicriteria evaluation was conducted without integrating GIS. A table was created roughly following Malczewski (1999, see also figure 3 below and figures 4 and 5). The goal was to find which kitchen was the most economically sustainable while nonetheless following the goals of the program. The decision-makers were the Yoghurt Mamas, APYN staff, and the customers. Preferences and therefore weights were derived from the interview transcripts, rather than the usual MCE practice of administering a questionnaire to determine pairwise comparison through 'intensity of importance' (see Saaty 1980; Malczewski 1999; Sumathi, Natesan and Sarkar 2008; Drobne and Lisec 2009). This was also the case as the amount of pairwise comparisons increases significantly, as the number of criteria does: for example, for five objectives and nine criteria, the amount of pairwise comparison decisions would be 190 (Harker 1987a). This is not a practicable amount of repetitious questions<sup>1</sup> to administer as an oral questionnaire; participants may begin to question the purpose of the exercise. Objectives tend to follow a minimise/maximise paradigm. The alternatives are each kitchen, as the analysis will determine (depending on the objectives and goal) a ranking of all kitchens. The attributes are criteria, including characteristics such as milk cost per litre, or the monthly income given to each member. These form a hierarchy for multicriteria evaluation (see figures 3 and 4).

---

<sup>1</sup> i.e. "Do you prefer criteria x to criteria y and by how much?" and so on until all possible relationships are explored



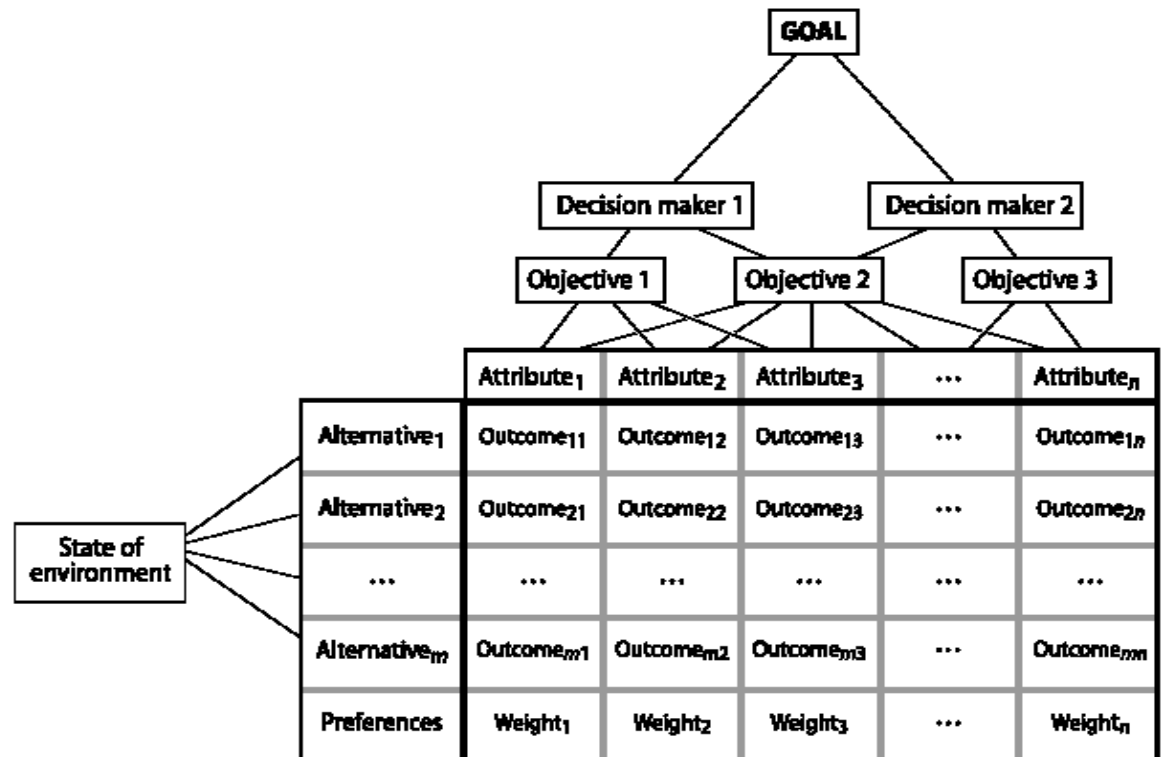


Figure 3: Multicriteria Decision (or Evaluation) table (from Malczewski 1999)

### 3.3 Analysis

#### 3.3.1 The Interviews

The interviews were analysed using printed transcripts and Microsoft Word. The transcripts were read once, and then brief notes were taken during the interviews and more detailed notes afterward in order to create preliminary categories. The transcripts were read for the first time and notes were made in the margins. Then, they were reread and headings were noted beside the content, through a process known as ‘open coding’. After this, the categories were grouped under higher order headings, and some overlapping categories were collapsed together. Finally, texts of the same code were combined into a single document. All of the coding, like the transcription, was done by hand. In order to extract preference information for the MCE, the texts were read keeping in mind the criteria and subcriteria of the analysis, and when a preference was expressed, this was noted.

### 3.3.2 Multicriteria Evaluation and Decision-Making

Spatial decisions are made by the vast majority of people every day. Spatial decisions occur in almost all sectors of the economy: where a new branch should be located; which resource to harvest; or how to route deliveries. Complexity often arises out of differences in preference, values, and opinion on the part of stakeholders; while one member of a group may prefer to, for example, locate a new branch closer to the central business district, others may prefer to locate closer to new residential developments. As these spatial decisions become increasingly complex and significant, a need to formalise these problems and document the rationale for the chosen alternative occurs (Greene et al. 2011). Multicriteria evaluation (MCE) is often used in complex decision problems in order to formally explore alternatives, and, in conjunction with Geographic Information Systems (GIS) can help decision-makers solve difficult spatial problems with multiple criteria types (see Eskandri, Homae, and Mahmodi 2012). Furthermore, GIS is limited in storing preferences; the introduction of these value judgements can be achieved through introducing MCE functions (Malczewski 2010). Greene et al. (2011) argue further that MCE focuses on “eliciting and making transparent the values and subjectivity that are applied to the more objective measurements, and understanding their implications.” This focus is emphasised by the use of ‘decision evaluation’ rather than ‘decision-making’, which reveals the subjectivities inherent in any decision problem involving people. Therein lies the strength of MCE: the integration of quantitative and qualitative data. MCE originates in economic theory, as an interpretation of efficiency; most problems attempt to balance cost, time, quality, and adequacy (Zavadskas, Kaklauskas, and Vilutiene 2009; Gemitzi et al 2007).

There are basic six elements in a MCE problem: i) the goal; ii) the decision-makers (in one or more groups); iii) the evaluation criteria (objectives and/or attributes); iv) the decision alternatives; v) the decision environment/states of nature; iv) the set of outcomes or consequences (Malczewski 1999). First comes the goal, which is simply put, what the decision-maker is attempting to achieve, such as determining the best location for a probiotic yoghurt kitchen, or even which kitchen possesses the ideal qualities with respect to the goal. The second component is the decision-makers or stakeholders, whose

preferences, beliefs, and values determine the structure of the decision matrix, often through the third component, the objectives and/or attributes. An objective describes the goal, and is generally expressed as maximising or minimising a certain attribute, such as, in the yoghurt example, maximising daily customer visits, or minimising rent. Objectives are operationalised by attributes – each objective must be described by at least one attribute, such as rent-cost (Malczewski 1999). The attributes describe the alternatives, which can refer to alternative courses of action or the various kitchens.

Alternatives in spatial decision problems feature two basic elements: action (what to do?) and location (where to do it?) (Malczewski 1999, 2004). Influencing the alternatives are the states of environment, i.e. general unpredictability, such as the state of the economy, natural phenomena, or other uncontrollable situations, all independent of one another and immutable by the decision-maker (Malczewski 1999). Outcomes are determined by the interaction between a particular alternative and a particular attribute. The preferences of the decision-makers are given in terms of the weights assigned to the evaluation criteria, weights being the standards of judgement for the desirability of the alternatives. Weights can be coordinated if they are expressed through the same measurement unit, such as money (Zavadskas, Kaklauskas, and Vilutiene 2009). Evaluation criteria include both attributes and objectives. A GIS-MCE at its core, according to Malczewski (2004), is the “utilization of geographical data, the decision maker’s preferences and the manipulation of the data and preferences according to specified decision rules. Accordingly, two considerations are of critical importance for spatial MCE: (i) the GIS capabilities of data acquisition, storage, retrieval, manipulation and analysis, and (ii) the MCE capabilities for combining the geographical data and the decision maker’s preferences into unidimensional values of alternative decisions.” GIS is included if the problem or elements thereof include a spatial element, otherwise the analysis can be conducted solely using MCE methods. In the case of this study, GIS is used as a supplement to the data, rather than the decision space itself, due to a lack of granularity in recent Tanzanian Census data as well as the unavailability of detailed, accurate geospatial data.

How MCE is conducted is dependent on several problem characteristics, the first of which is whether it is a multiattribute or multiobjective decision problem. Multiobjective problems are examined in a continuous design process, and are generally more complex than multiattribute problems, which are a discrete selection process (Malczewski 1999). Each type implies a series of different methods: multiattribute techniques assume that the number of alternatives is explicit, whereas in multiobjective methods these alternatives must be generated (Malczewski 2004). In the case of this thesis, the decision problem is a multiattribute one, as there are ten kitchens to be compared. Multiobjective methods include mathematical programming and heuristic algorithms (Greene et al. 2011; Malczewski 2004, 2006a). Multiattribute methods include simple additive weighting, analytic hierarchy process, and ideal point methods (Malczewski 1999). In most cases, multiattribute techniques are used (see Malczewski 2006a for a review). Further problem characteristics include whether it is an individual or group decision; the degree of certainty involved, and how uncertainty is dealt with (Malczewski 2006a).

Individual decision-making does not necessarily mean that only one decision-maker is involved, rather, that the goal of each group member is the same, i.e. a single-goal-preference-belief structure (Malczewski 1999). A problem can be classified as group decision-making if any of the preferences vary. This can be reframed as team decision-making and coalition decision-making, at least in the context of multiattribute decision problems. A team is a group of people with a mutually consistent set of preferences, which is amenable to a single decision model and analysis, whereas a coalition is a group of people who can agree on the structure of the problem (e.g. alternatives and criteria), but not on the relative importance of evaluation criteria (Malczewski 1999). A coalition problem means that a single model can be used, but multiple analyses should be conducted as the difference in preference leads to different orderings of the alternatives. For individual decision-makers who disagree on the structure of the problem, Malczewski (1999) states that “they must be regarded as participating in multiple and separate decisions”, however this type of problem appears uncommon in the multiattribute literature, as it lends itself to multiobjective decision analysis (Malczewski 2006a).

The next classification characteristic for multicriteria evaluation is the degree of certainty inherent in the problem. There are, generally speaking, two sources of uncertainty involved in decision-making: the validity of the information, and future events leading to differentially preferred outcomes (Malczewski 1999). Problems with predictable outcomes can be referred to as deterministic situations, which imply certainty; all other problems featuring some degree of uncertainty are labelled “decision problems under uncertainty” (Malczewski 1999, 2004). While some situations come very close to certainty, so that uncertainty may be disregarded, others do not. Malczewski (1999) proposes two basic types of uncertainty: i) that which is associated with limited information; and ii) that which is associated with imprecision (fuzziness) concerning the description of the meaning of the components of the situation. Therefore, uncertain decision situations can be classified as probabilistic (stochastic) or fuzzy. Probabilistic decisions are solved using statistics, and the concept of uncertainty is treated as secondary to the concept of probability (Malczewski 1999). However, as the outcome of many events are ambiguous, fuzzy set theory is more appropriate, which also allows for the expression of preferences linguistically, with a range of belonging, or degree of membership calculated from 0-1 (Malczewski 1999, 2006b).

The first step in MCE is defining the problem. This includes recognising the problem, and therefore creating the goal and determining the decision-makers (Malczewski 1999). The next step is to specify a comprehensive set of objectives, reflecting all relevant concerns, and measures for achieving these objectives, which are the attributes (Malczewski 1999). Scales of measurement and constraints must also be established, in order to determine the degree to which objectives are achieved (Malczewski 1999). The process of generating alternatives should be related to both the set of evaluation criteria and the value structure of the problem. Each alternative is assigned a decision variable (attribute), in order to measure the performance of alternative decision. Decision variables can be deterministic, probabilistic, or linguistic (qualitative); these, of course, are governed by the set of constraints defined earlier. The constraints are used to determine a set of feasible alternatives (Malczewski 1999, 2004). The final step is the use of decision rules or aggregation functions, which dictate how to

best rank alternatives. There are several methods to rank alternatives, and they can be roughly classified as compensatory or noncompensatory methods.

Non-compensatory approaches are easier to understand, but involve hard cut-offs for the inclusion or exclusion of criteria; they are often used for screening, rather than in the main analysis itself (Greene et al. 2011). The two simplest methods are conjunctive and disjunctive decision rules, which are based in Boolean logic. Conjunctive decision rules choose alternatives that meet a cut-off value on every criterion (logical AND operation), whereas disjunctive decision rules choose alternatives that meet a cut-off value on at least one criterion (logical OR operation) (Jankowski 1995; Greene et al. 2011). The major difference between these methods is how risk is dealt with: conjunctive decision methods are risk-averse (as all criterion must be considered), while disjunctive decision methods are therefore riskier (Eastman 2009). The main drawback to non-compensatory methods is that, due to their simplicity, they do not adequately reflect group preferences, and only work where there is little trade-off, despite (theoretically) yielding similar results to weighted linear combination methods (which are compensatory). This is often not the case, as weighted linear combination methods compensate for differing scores differently, and feature a higher degree of trade-off, or substitutability (Jiang and Eastman 2000).

In order to mitigate this, compensatory decision methods can be utilised. However, prior to conducting compensatory aggregation methods, the criteria must be given relative weights using one of several methods. The weighting stage is where preferences come into the model. These preferences can be assigned through several different methodologies: ranking, rating, trade-off analysis and pairwise comparison, a part of the analytic hierarchy process (Malczewski 1999; Greene et al 2011). In terms of ranking, there are three different weighting methods, though prior to calculation each decision-maker ranks the criterion. The three weighting calculations are: i) rank sum, where each criterion is weighted and subsequently normalised by the sum of all weights (see equation 1a); ii) rank reciprocal, where weights are calculated through the normalised reciprocals of a criterion's rank (see equation 1b); and iii) rank exponent, where the decision-maker supplies more information, that is the weight (on a 0-1 scale)

of the most important criterion, which is then used to solve for the exponent in the formula (see equation 1c).

$$\text{A)} \quad w_j = \frac{n - r_j + 1}{\sum(n - r_k + 1)}$$

$$\text{B)} \quad w_j = \frac{1/r_j}{\sum(1/r_k)}$$

$$\text{C)} \quad w_j = \frac{(n - r_j + 1)^p}{\sum(n - r_k + 1)^p}$$

**Equation 1: Formulae for ranking methods. A) Rank sum; B) Rank reciprocal; C) Rank Exponent. Variables:  $w_j$ : the normalised weight for the  $j$ -th criterion;  $n$ : total number of criteria;  $r_j$ : the rank position of the criterion (from Malczewski 1999).**

The ranking methods, due to their simplicity, are appealing, but they are generally less useful in dealing with larger numbers of criteria (Malczewski 1999). In most cases, according to Malczewski (1999), it is advisable to go beyond rank-order approximation, using rating methods, trade-off analysis or pairwise comparisons.

The pairwise comparison method was developed in the context of the analytic hierarchy process (AHP) (Malczewski 1999). This method consists of three steps: i) developing the pairwise comparison ratio matrix; ii) computing the weights of relative importance; and iii) estimating the consistency ratio (Malczewski 1999; Sumathi, Natesan, and Sarkar 2008). As for step one, Saaty (1980) created a scale of the ‘intensity of importance’ for pairwise comparison, which is commonly used in the literature (see table 3; Vahidnia, Alesheikh, and Alimohammad 2009; Sumathi, Natesan, and Sarkar 2008; Malczewski 1999; Meng, Malczewski, and Boroushaki 2011; Drobne and Lisec 2009). Each criterion is given a preference score following this scale: it is important to note that these preferences are relative to the other criterion in the pair, e.g. given the

yoghurt example, the pair could be ‘rent/month’ and ‘utilities/month,’ and decision-makers could decide that rent criterion is strongly prioritised in comparison with the utilities criterion. This would give the rent criterion a value of 5 in comparison to utilities, and therefore the utilities criterion would have a value of 1/5, as in a sense, the distance from population centre criterion is five times more important to the decision-makers. This maintains internal consistency. However, if this is a group decision problem (split preferences), each separate set of preferences would have its own ratio matrix, and the second and third steps become more complex.

**Table 3: Scale for pairwise comparison (from Saaty 1980)**

Intensity of Importance	Definition
1	Equal importance
2	Equal to moderate importance
3	Moderate importance
4	Moderate to strong importance
5	Strong importance
6	Strong to very strong importance
7	Very strong importance
8	Very to extremely strong importance
9	Extreme importance

In terms of calculating the criterion weights, for the first case (single ratio matrix), the values of each column are summed, and then the values of the said column are divided by the total, resulting in what Malczewski (1999) termed a ‘normalised pairwise comparison matrix’. The second step is to calculate the average of each row in the normalised pairwise comparison matrix (the denominator being the number of criteria



under consideration); the weights thus are “the average of all possible ways of comparing the criteria.” (Malczewski 1999). The calculation of the consistency ratio is fairly straightforward. It begins with a comparison of the data from the original pairwise comparison matrix and the normalised pairwise comparison matrix. This is done by multiplying the weight for the first criterion by the first column, the second by the second, and so forth, and then summing these values over the rows (Malczewski 1999). The consistency vector for each row is determined by dividing the summed row values by the previously determined weight (of the row’s criterion). Two more calculations must take place to determine the values of lambda, or the eigenvalue ( $\lambda$ ) and the consistency index (CI). Lambda is the average value of the consistency vectors. The consistency index is computed under the assumption that “ $\lambda$  is always greater than or equal to the number of criteria under consideration ( $n$ ) for positive, reciprocal matrixes, and  $\lambda = n$  if the pairwise comparison matrix is a consistent matrix. Accordingly,  $\lambda - n$  can be considered as a measure of the degree of inconsistency.” (Malczewski 1999, for formula see equation 2). The consistency index is then used in the calculation for the consistency ratio, which is the actual consistency index divided by the consistency index of a randomly generated pairwise comparison matrix (Malczewski 1999).

$$CI = \frac{\lambda - n}{n - 1}$$

**Equation 2: Consistency index formula (Malczewski 1999)**

It must be remembered that these weights can also be assigned to objectives (which are also criteria in their own right). In this case, if an objective is influenced by more than one attribute, the weighting assigned to the objective must be reassessed in terms of the attributes, and then the weight assigned to the objective redistributed by that scheme. For example, if the criterion ‘costs’ has four attributes, such as milk cost per litre; rent/month; utilities/month, and fuel/month, and its normalised weight is 0.5, this must be divided amongst the four with another pairwise comparison. This is often the case in analytic hierarchy process methods (AHP), which are not only weighting methods but also compensatory aggregation methods for decision rules (Malczewski 1999).

In the case of group decision-making, each preference-bloc creates their own pairwise comparison matrix. In order to reconcile these preferences, the geometric mean rather than the arithmetic mean is calculated in the creation of the normalised pairwise comparison table, in order to maintain reciprocity and compensate for inconsistencies (Barzilai 1997; Buckley 1985; Harker 1987a). Qualitative criteria weights are subjective, and uncoordinated, but they can be coordinated if they are expressed through the same measurement unit; Zavadskas, Kaklauskas, and Vilutiene (2009) developed a method for coordinating quantitative and qualitative weighted criteria, which converted expert determined weights into normalised, comparable values.

The pairwise comparison weighting method is one of the main components of AHP. AHP is a strong approach in its relative ease of calculation, as well as its ability to manage differing preferences and inconsistencies in judgement (Vaidya and Kumar 2006; Harker 1987a). The way an AHP is conducted begins by stating the problem and determining the objectives, criteria, and alternatives (Vaidya and Kumar 2006). In this approach, a hierarchy is created, such as goal-objective-attribute-alternative (other variations are possible, see Malczewski 1999; Vaidya and Kumar 2006). After this, pairwise comparisons are conducted as described above on each element-level of the problem (e.g. objective level, attribute level). This includes the calculation of lambda (or the eigenvalue), the consistency ratio, and normalised values for each alternative/criterion pair (Malczewski 1999; Vaidya and Kumar 2006). If the eigenvalue and consistency ratio are considered satisfactory (within a desired range), then the decision is made based on the normalised values, otherwise, the process is repeated until the values lie within the desired range (Vaidya and Kumar 2006). In the case of AHP, a consistency ratio is generally calculated on each decision matrix in order to ensure that judgements follow two rules: the transitivity rule and the reciprocity rule. The transitivity rule, in essence, means that, given three objects to compare ( $a, b, c$ ), if the decision-maker prefers  $a$  twice as much as  $b$ , and  $b$  three times as much as  $c$ , therefore she must prefer  $a$  six times as much as  $c$  (see Ishizaka and Nemery 2013). Following this, the reciprocity rule can be postulated as if  $a$  is preferred twice as much as  $b$ , then  $b$  must be preferred half as much as  $a$ .

One of AHP's main limitations is that as the number of criteria increases, so does the amount of pairwise comparisons. For example, for five objectives and nine criteria, the amount of pairwise decisions would be 190 (Harker 1987a). The number of comparisons may be limited by expanding the hierarchy – by having an objective level, criteria are categorised and therefore share in the preference assigned to their respective objectives, rather than comparing all criteria at once (creating more comparisons). In the case of multiple decision-makers, decision matrices can sometimes be incomplete. For what Harker (1987b) considers a 'reflexive connected graph', in which there must be, by definition, at least one path between the row ( $i$ ) and column ( $j$ ). The solution Harker (1987b) proposes to this problem is to calculate the average of all intensities of all paths connecting  $i$  and  $j$ , though if there are any inconsistencies, this must be, as in group decision-making, the geometric mean. Harker (1987b) proposes a number of steps for incomplete pairwise comparisons: i) obtain the preferences of the decision-maker to create a connected graph; ii) using the completed comparisons, derive the missing elements using the geometric mean of the intensities of the elementary paths, and calculate the weights; iii) calculate the derivatives of the weights of the missing elements, and select the next question; iv) if this question reaches a 'stopping rule', stop, otherwise record the comparison, and return to step ii). Stopping rules are conditions which indicate when to stop making pairwise comparisons, and can include the decision-maker deciding that she is finished; whether new information influences weights or not; and the continual making of comparisons until the ordinal ranking (intensity of importance values) cannot be reversed (Harker 1987b). A similar method is also detailed by Ishizaka (2012), using clusters and pivots: for each criterion, all alternatives are divided into clusters by the decision-maker; this is a subjective method as the majority of AHP includes qualitative criteria. The last alternative in a cluster becomes the pivot at the border of the clusters, which is used to convert between the clusters and complete the rest of the unexamined criteria (Ishizaka 2012, Ishizaka and Nemery 2013). Another limitation is criteria are not necessarily mutually exclusive, and that they may be measured on different scales, but sometimes conversion to mutually intelligible scales is possible (Byun 2001).

Fuzzy set theory can be used in conjunction with AHP and other compensatory methods, such as weighted linear combination (WLC, a simpler version of AHP, see

Drobne and Lisec 2009). WLC includes simple additive weighting methods (SAW), which are calculated by creating standardised scores from raw data: that is, the numerator is the maximum value subtracted by the value being weighted, and the denominator is the maximum value subtracted by the minimum value (Malczewski 1999). Fuzzy set theory is particularly appropriate in MCE using GIS, where there is continuous variation in geographic phenomena (Malczewski 2004). In order to integrate fuzzy membership with decision rule aggregation, qualitative values' degree of membership must be quantified (much like in table 3, see Malczewski 2004). This is done on a scale of membership between 0 and 1, rather than having 0 and 1 as the only possible membership degree, as in classical set theory. Fuzzy set theory "provides a framework for representing and treating uncertainty in the sense of vagueness, imprecision, lack of information, and partial truth." (Malczewski 2004). Methods for determining fuzzy membership include the semantic import model, where expert knowledge assigns membership on the basis of a property; the similarity relation approach, which uses pattern recognition to search the data for fuzzy membership; and finally the membership function, which is determined through experimentation with participants (Malczewski 2004). However, there is no definite method for determining the degree of membership, and therein lies the limitation of fuzzy set theory (Malczewski 2004).

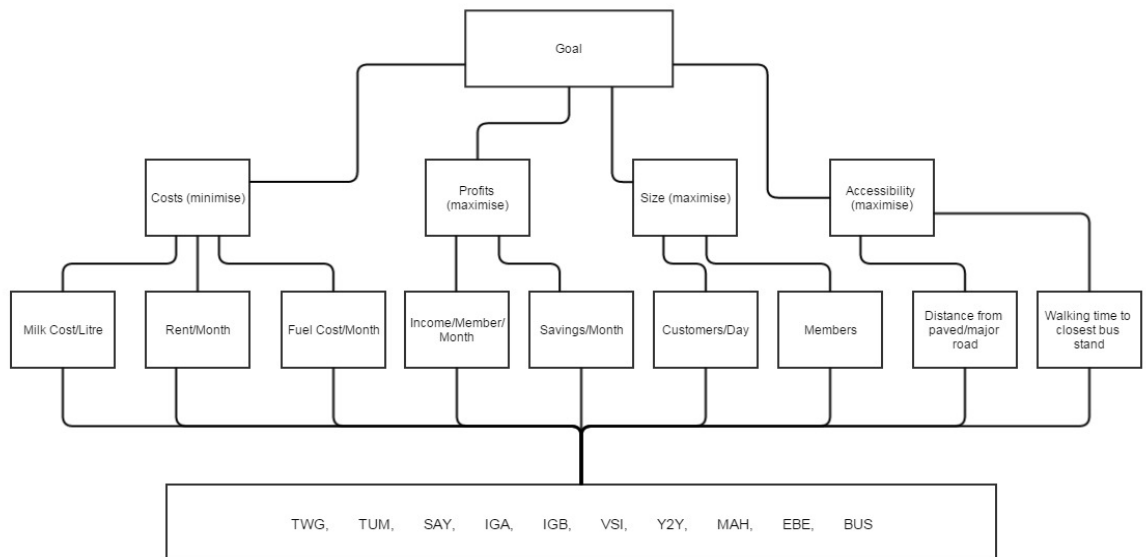
Sensitivity analysis is a procedure for ensuring the robustness of the recommendation. Small changes are made in the inputs of the analysis, such as the criterion values or weights, and if the outcomes are affected significantly, this signifies that elements of the analysis must be re-examined (Malczewski 1999). It identifies the effects of changes in data and preferences on the ranking of the alternatives, and if these effects do not significantly alter the results, then the ranking is considered robust. This is important when the problem data feature some degree of imprecision. Sensitivity analysis gives the decision-makers more confidence in the proposed choice if the ranking is stable (Karnatak et al. 2007). However, a review by Delgado and Sendra (2004) found that sensitivity analysis is not widely carried out in practice: only 61% of papers reviewed were found to conduct some form of sensitivity analysis (though not always explicitly), and the sensitivity analysis was found to be simplistic in nature. Given this lack of clarity, sensitivity analysis was not undertaken as a part of this thesis.

The result of the MCE process, no matter which methodology is chosen, is a recommendation for future action, based on the ranking of alternatives. Visualisation techniques are useful to present and communicate the results to the decision-makers (Malczewski 1999). Often sacrifices in rigour must be made in the name of time or financial cost, such as using non-compensatory methods for screening; assuming a deterministic decision space when imprecision is ‘insignificant’; or due to the skill of the researcher performing the analysis (Greene et al. 2011). This is also the case in nonstandard decision contexts, where rigorous analysis may not be possible. MCE methods, however, provide a fairly robust tool for spatial decision-making, allowing for the consideration of multiple attributes quickly and responsively to decision-maker preferences. A variety of fields continue to adopt MCE, in particular the health and development field continues to bring itself to the forefront (see for example Bell, Schuurman, and Hayes 2007; Bell and Schuurman 2010; Symeonakis, Robinson and Drake 2007).

For this thesis, the majority of analysis was conducted using Microsoft Excel. Problem structuring closely followed Malczewski (1999, see figure 3) and Ishizaka and Nemery (2013). A hierarchy was mapped out (see figure 4) following a goal-objective-criteria-alternative structure. Four objectives and nine criteria were compared. This meant six comparisons at the objective level, then six at the criteria level. The pairwise comparisons were made by me, taking into account WHE/APYN’s goals, as well as those of the kitchen group members. These were converted to weights, then standardised on a 0-1 scale, and finally, consistency ratios were calculated (see equation 2). This was done at the objective and criteria levels. Global weights were calculated by multiplying the local criteria weights by the respective objective’s weight in order to find the contribution of each criterion to the goal (1.00). The characteristics of the kitchens were also normalised using the value function method, specifically piecewise linear functions (see Malczewski 1999). These normalised values were multiplied by the global weights of the criteria, and this resulted in the final ranking of the kitchens.

In terms of eliciting preferences, the interview guide was followed as closely as possible, but participants often answered in unexpected, enlightening ways, especially

when it came to questions of location (see Appendix 3). This called for a large degree of flexibility in the field. Some of the kitchen workers pointed out that language was an issue (see 4.2.1): using a translator alone may not have been enough to understand, though the researcher spoke some Swahili. While the researcher's positionality obviously differs from that of the participants, the reflection undertaken attempted to mitigate it, and the participants' thoughts and wishes were communicated as best as possible through the text (King 2002; Johnston and Sidaway 2004). The mixed methods approach, using methodological triangulation further endeavoured to draw out the positionalities and experiences of the participants (Baxter and Eyles 1997).



**Figure 4: Hierarchy for multicriteria evaluation problem**

### 3.4 Ethical Considerations and Limitations

Ethical approval was obtained through the Western Ethics Board (see Appendix 1). The unpredictability and variability of geographic and qualitative research cannot

always be dealt with by strict Ethics Board codes (Dowling 2010). It is always necessary to be self-critical and reflexive, as research relationships are often asymmetrical and potentially exploitative, especially in research on vulnerable populations (Dowling 2010; Liamputtong 2007). To this end, I kept a series of notes on my thoughts, feelings, and experiences in the field, tried to integrate herself in local everyday life by building relationships with people in her neighbourhood, and attempted to be empathetic and thoughtful while in Tanzania, even when not directly conducting research.

The resulting data was kept confidential and secure in country by keeping it in a locking cabinet, in transit by keeping it on my person at all times, and by keeping it in a locked office to which I am the only key-holder. The interview audio recordings and transcripts were only accessible to me, the transcriptionist, and the transcript translator. There were three research assistants in total, and they all signed a confidentiality form and understood the importance of research confidentiality as they had assisted on prior studies in the area.

I made certain to inform participants that their participation was entirely voluntary, and if they wanted to refuse participation, even after starting, that it was perfectly acceptable to withdraw at any time. They were also informed that they could participate in just part of the research (i.e. only answer certain questions) if they were uncomfortable with other parts. Participants were asked whether they understood what the research was, that the interview would be audio-recorded, and the consent process, before signing the consent form and commencing the interview. This ensured that participants did not feel coerced into participating, and that their information was kept confidential (Halai 2006). Furthermore, when sensitive questions were asked, participants were doubly ensured that the information would not be associated with their name, and that it would not be passed on to the administrative staff without anonymisation and aggregation. Due to the differing power dynamics, interviews were not conducted right after arrival in Tanzania. Power imbalances can influence the quality of the data (Pearson and Paige 2012). I participated in APYN's day-to-day work and visited the sites several times to create social engagement and rapport, which allows for increased trust and legitimacy (Howitt and Stevens 2010).

As not all kitchen group members, customers, and APYN staff were interviewed, it is possible that some stories were missed. However, thematic saturation was reached in each group (see Baxter and Eyles 1997). The interviews with the kitchen group members contained varying amounts of people, and therefore some participants could have held back information, but many of those who did not interview alone expressed comfort in interviewing with colleagues. On one occasion, the interview was interrupted by a member of APYN staff and a Canadian intern from WHE arriving as the conversation turned to issues with how the program was administered. The participant became visibly uncomfortable, and the topic was changed to something more neutral until their departure. The large majority of participants were comfortable, even with colleagues present, discussing their issues with the program. These issues were only brought up when the participants insisted; I enquired as to whether they desired to continue and did not force any topics of conversation.

Initially, the multicriteria evaluation was intended to be done with GIS, however, the data obtained from the Tanzanian National Census and the City of Mwanza lacked sufficient granularity. The data used in the analysis was collected by another researcher (Kate Grantham), and while she gave detailed information about how this was (rigorously) undertaken, there could be some error in translation. The lack of granularity meant that the analysis could not produce a 'decision surface' in GIS, but it did not mean that MCE could not be done. Therefore, MCE was conducted comparing the varied characteristics of each kitchen in turn following Zavadskas, Kakalauskas and Vilutiene's (2009) integration of both qualitative and quantitative criteria.. The preferences were therefore not ranked by those working for APYN, WHE, or in the kitchen groups due to issues of practicality, but rather by the researcher acting as a conduit of preferences (see 3.2 for a discussion of the researcher as instrument).

### 3.5 Conclusion

This chapter has outlined the research design and methods of the study. An exploratory approach with a flexible design enabled conversation to flow, and adaptations to be made to methods as the research was conducted. The methodological triangulation



of the interviews, hand-drawn mental maps, and MCE allowed several different avenues of inquiry to be pursued.

## Chapter 4

### 4 Results

This chapter examines the results of the research. The first section reiterates the context of the WHE/APYN project. The next section presents the qualitative interview findings, followed by a section comprising the steps of the multicriteria evaluation and its results. It should be noted that names both of participants and of those mentioned in conversation with participants have been changed to maintain confidentiality. Quotations were selected in order to give voice to as many participants as possible, and to present an accurate narrative. As many of these quotations were translated from a second language (Swahili), minor stylistic and grammatical changes have been made to the texts in translation to mitigate linguistic issues. The multicriteria evaluation attempted to encompass all viewpoints expressed by participants via the researcher's interpretation of both the interviews and three months of interactions with them.

#### 4.1 Context

The original goals of the Western Heads East (WHE), and by extension, the African Probiotic Yoghurt Network (APYN) project were to help improve the health status of those living with HIV/AIDS (known as beneficiaries) by providing them with free probiotic yoghurt, and also to provide a sustainable business opportunity for resource-poor women and youth. The intention of the project is that both goals can be met through selling the yoghurt to regular customers, which would therefore provide funds to serve probiotic yoghurt free to the beneficiaries, as well as generating income for kitchen group members. This thesis predominantly focuses on the second goal of economic sustainability, though the beneficiaries play an important part in the perception and success of the kitchen. The kitchens are run by community groups, and the intention of WHE project, which arranges for the paying of start-up costs and provision of equipment and training, is that the community own each kitchen in full. APYN assists and monitors these kitchens, and the kitchens are supposed to be identified as a network, rather than as branches of a larger conglomerate. However, kitchen groups are not

necessarily aware of one another, and some depend heavily on the support of APYN. Communication is key to maintaining and progressing this project.

## 4.2 Interview themes

Quotations here were selected in order to present as many standpoints as possible. They are grouped under a number of themes: communication, control, and power; meeting project goals; making money; packaging; marketing and customer feedback, and, finally, stigma on the beneficiaries and other barriers to success.

### 4.2.1 Communication, Control, and Power

There appear to be major communication issues on several fronts. These include miscommunication between the Canadian branch of the project and the Tanzanian, lack of communication intra-network, and misunderstandings arising from interactions between APYN staff and the kitchen group workers. These also occur between interns sent by WHE and kitchen workers, mostly due to linguistic and cultural barriers. Tanzania's culture demands respect for elders, and it therefore can be tricky to coordinate initiatives without appearing rude or disrespectful, even for Tanzanian staff. One major difficulty is in book- and record-keeping, as business skills have not been consistently taught to the kitchen workers, even with APYN staff emphasising the importance of these skills. There was one workshop held to teach bookkeeping, and this brought all the kitchens together, however, only incremental changes were made. Despite this, individual kitchen groups have not met frequently and do not know much about each other and APYN as a whole.

*“We should meet every one to three months so that we can discuss the challenges we face. We help each other grow; if we make mistakes, we can tell each other. However, APYN staff said that my idea [for regular meetings] was wrong and criticized me, so now I keep quiet.” Abasi, kitchen worker*

It seems odd that network-wide meetings are not held regularly. Some kitchen groups were only vaguely aware of one another, mostly if the other group was located close to their own, or to their house. As one of APYN's purposes is to act as a facilitator

for linking these groups, perhaps regular meetings should be required. Furthermore, regular meetings would benefit the capacity-building goal of APYN by adding educational components to these meetings. There was a workshop in bookkeeping, but some kitchens still do not feel confident in their ability to keep records:

*“Another problem is that some of the kitchens do not know how to keep records or to do bookkeeping; they haven’t learned it. They still need help with that. [...] We should arrange further lessons, as the first one we had was not sufficient.” Diana, APYN staff.*

Entrepreneurial skills, particularly book- and record-keeping, are seen as key to understanding and progressing the kitchens in terms of economic prosperity and building capacity:

*“You find that details are missing from the records, like even a full week isn’t there. No one keeps records or knows how they should be done, and they don’t even know why keeping records is so important. At times they feel like their kitchens belong to APYN, which is the biggest challenge in my opinion.” Andrew, APYN staff.*

With education comes empowerment and the ability to determine one’s own destiny. For example, basic training in accounting and business skills, for example, was found to significantly improve economic performance (Drexler, Fischer, and Schoar 2010; Mano et al 2011). One of APYN’s objectives is to assist with building capacity, but unfortunately, according to some participants, assistance is not always forthcoming from APYN, despite desire for change and progress:

*“We’ve been having trouble opening a bank account. We found that they [APYN] don’t cooperate with us [...] I don’t know who we need to talk to to open an account, or even where to go, but they blame us. They require us to open an account, but they don’t help us at all.” Irene, kitchen worker*

APYN, in order to more easily facilitate payments from the donor (Western Heads East), is trying to have all kitchens open their own bank accounts, but this is not a simple nor rapid process. Documents must be procured and constitutions written for the groups, as the accounts are to be opened for each kitchen, and Tanzanian banks are strict.

Furthermore, there are few readily accessible bank branches in Tanzania, with less than one branch per 100,000 population and only 12% of Tanzanians having a bank account (see Lawuo et al 2013). There are a number of bank branches in central Mwanza, but many of the kitchens are a fair distance away (see figure 2). Perhaps mobile banking could be a more ready solution, but it remains to be seen whether it can be applied in this case. There have been inconsistencies too with the monthly payment from WHE, distributed by APYN:

*“In the beginning, they told us that they’ll pay us four hundred shillings per serving. However, when we went for our payment, they paid us three hundred and seventy shillings for each serving, rather than what was promised before we started the project.”*  
*Neema, kitchen worker*

Several kitchens have mentioned problems with receiving payments late, and the process through which payments are made. Payments are sent to APYN, and then distributed in the APYN office in cash to members of each group when the payment is ready. At least two members of each group have to go to the office to receive the payment. Late payments cause problems for the kitchen workers, particularly with their suppliers:

*“Another thing is waiting for payment from APYN. I find that the milkman insists on coming with me to the office to get the money, hence our costs increase due to transport. This is because the sponsors don’t pay us in advance. Also, if one of us goes to collect the payment alone, she is asked at the office why she came alone; we have been told to come in pairs.”* Ania, kitchen worker

When asked whether the payment could be done during the weekly supplement delivery, Ania responded with an emphatic yes. This is, however, assuming that payments will continue to be done physically, rather than through the banking system. Furthermore, this assumes too that payments will continue: funding from WHE may end. Staff members of APYN deliver probiotic supplement to the kitchens weekly, and monitoring activities are often conducted at that time, such as taste tests, record checking, and progress reporting. Another worker explained her feelings on payment delays:

*“Yes, the delay of payment leads us to delay paying the milk suppliers. As for me, I hate people who drink yoghurt, then promise to pay some other time, because I have too little money to pay for advances, since I live far away and rely on the daladala [bus service]”*  
*Nuru, kitchen worker*

As many of the kitchens rely on the monthly payment to settle bills for rent, fuel, and milk, this can cause issues. Ideally, the kitchens would not rely solely on the money from WHE, but until they are economically self-sufficient, late payment remains a significant issue. Some milk suppliers are sympathetic and allow for deferred payment, but some workers have faced upsetting situations:

*“The dates are not predictable, we can receive money on the eighth, the ninth, or the tenth, and honestly that is the problem, because the person bringing us milk wants to be paid. The milkman expects to get the money on the thirtieth or thirty-first if not the first. Therefore, when we fail to pay them at the end of the month, and end up paying on the eighth or tenth, it creates problems... we had a certain client in the past who used to bring us milk, when we failed to pay him on time, he said ‘I will kill myself here if you don’t pay me. I won’t leave here and go home if you don’t pay me my money’; we finally managed to call APYN, and told them about the person selling us milk. The milkman thought that we had been paid the money and that we were just refusing to pay him. I told him that we have not yet been paid and that he should remain calm, and finally he understood. Quite honestly, if had he been a bad person, we wouldn’t have known what he would have done. He completely stopped bringing milk after we paid him. We started buying milk from someone else.”* Faida, kitchen worker, TUM

The kitchen groups do try to make changes when faced with these and similar challenges. Many of their challenges arise from a lack of funds. Kitchen workers do open dialog when it comes to the root of these problems, the promptness of the monthly payment:

*“They have improved the situation now after we spoke out, though they still pay us late”*  
*Joyce, kitchen worker (TWG)*

However, even with open dialog, conflict can still arise. Kitchen group members have claimed that some APYN staff do not communicate respectfully, especially if advice or instructions are not precisely followed:

*“They [APYN] are threatening to take the refrigerator. They troubled us a lot during the last project. It is the management. Some of them, there is a certain manager called M, [...] but we have no problems with her. There was also one called T. With just a minor mistake, he threatened to close the kitchen, though we opened our kitchen before he started working for APYN. We reached a point where we thought that they should leave us alone, since we already had established our kitchen before we met them [APYN]. I remember we even contributed some money towards it. They gave us the refrigerator. We pay for the kitchen.” Dalila, kitchen worker*

This is clearly not in line with the goals of the kitchen project. Community ownership is one of the most important tenets of WHE’s stated goals, and APYN staff themselves have mentioned that they have had difficulty emphasising a sense of ownership with kitchen group members. This could be due in part to issues with communication, which also remains an important aspect for the stakeholders involved with the kitchen, particularly choice of words and tone of voice. Different registers of language need to be used for different groups. For example, in Swahili, the dominant lingua franca in Tanzania, and Sukhuma, the major local language, a different vocabulary is required when speaking to elders in order to indicate respect. This respect for elders, and therefore a particular register of language, is key in Tanzanian society:

*“I can keep giving someone advice every day, all the time, but she might think that I’m controlling her. I think you know those people working in the kitchens, most of them are mamas [older women], and since I’m younger than them, they think I don’t have manners if I give them advice, especially if they perceive me as impolite. So (sighs) to avoid these problems, you have to be careful how you speak. It’s difficult to counsel someone who is older than you.” Diana, APYN staff.*

Secondly, the actual language used in interacting with kitchen members is important. Many of them speak their tribal languages (commonly Sukhuma) and Swahili,

and very little English. Yet interns (who do not speak any or adequate Swahili) are sent by WHE every few months for periods of two months or longer to assist APYN with various tasks aimed at the sustainability of the kitchens, such as the production of probiotic in the labs at the National Institute for Medical Research (NIMR), making inquiries at kitchens, the creation of protocols, and, as well, to conduct their own research benefitting WHE/APYN (like me). Consequently, it is not just the language barrier that can be problematic, but also the difficulty in understanding the Canadian interns' true objectives (see for example Raymond and Hall 2008):

*“Language, especially English, has taken over a great part of almost everything around here, and it gives us a lot of problems. [...] The ones [interns] that come to assist us, are English-speaking. [...] It is just the same as her [the researcher]... you [the translator] become a middleman, you moderate in between us. But we are human beings; there is a certain secrecy in our hearts, isn't there? [...] Therefore it would be better for us as a group to have someone like you [the translator] accompany them, because those who come here [the interns] mix up some words by using a language foreign to them, and likewise for us, since English is a foreign language to us. Therefore he [the intern] doesn't understand very well and just guesses what we mean.” Rostam, kitchen worker*

Often too interns are relied upon as extra labour for APYN, and they frequently relay messages and protocols to kitchens. This practice is not ultimately productive as the messages and protocols are poorly understood by kitchen workers if at all, as the intern communicates the messages predominantly in English. This miscommunication can create issues ahead as the messages can be assumed received when they are not:

*“Her language can be a problem, in most cases you can find that she [the intern] speaks in English [...] Sometimes when you go to the office or the intern comes here with something or to explain something to us, and is alone when she gets here, and only knows English, she uses English, doesn't she? [...] Therefore we fail to understand her and we think maybe she feels bad because of it. [...] We generally agree [with the intern], even when we don't understand what she has told us. [...] Now sometimes, she would have been sent by APYN to come here, to bring us something, therefore they think the message*



*has been sent and delivered, but we haven't understood it. With time, those guys [APYN] come and say 'we sent so and so to come here and give you a particular message and she said that you got it.' We would then be wondering what it was, since we didn't get it when she came (laughter). [...]It was so often that she came alone." Irene, kitchen worker*

From the comments above, it would seem the women try to avoid misunderstandings and the conflicts that may arise from them. APYN needs to challenge the attitude of taking a passive position on communication. There very clearly needs to be a review of the protocols surrounding intern visits. Interns should speak adequate Swahili to communicate on everyday matters, or if going on kitchen visits should employ a translator. The interns' shifting priorities are also acknowledged by a member of APYN's staff:

*"You should hire someone especially for this project [...] yeah, I don't think interns are more focused on this because they are mostly focused on their studies, just to get some course credit, because everyone comes and gets maybe a Bachelor's degree or a Master's degree, so the focus moves from the kitchens towards their own goals." Cyril, APYN staff.*

Communication is not necessarily seen as the problem in and of itself, as APYN staff acknowledge difficulties but remain patient:

*"We have good communication with the kitchens. APYN acts as a monitoring tool: an organisation to monitor the kitchen – they have to do things that APYN wants them to do [...] sometimes it is a bit difficult because many of the group members are not well educated, so it's a bit hard to tell somebody 'do this and this and this' and expect them to act accordingly. We have to go slowly, explain the importance of what we are telling them, and the disadvantage of not doing it. They slowly catch up." Janet, APYN staff.*

Another participant from APYN emphasized the need to help the kitchens and perhaps to adopt a new model of doing so:

*"APYN must help the kitchens – I don't think APYN is doing a lot to help the kitchens, because there are not any procedures or initiatives that aim to expand the kitchens, so*

*APYN should change the model of how they work in helping these kitchens. [...] We should make these kitchens able to stand on their own rather than opening more new kitchens.” Cyril, APYN staff*

Overall, the challenges faced by issues raised in the preceding theme on control, power, and communication then translate into meeting the WHE/APYN goals.

#### 4.2.2 Meeting Project Goals

The issues surrounding communication and also affect the meeting of the project’s goals, in particular the empowerment of resource-poor women and youth. An issue that was frequently raised as an obstacle to meeting the project goals was the monthly payment system. The kitchen workers do not seem to fully understand how the monthly payments are calculated, nor the deductions that apparently take place, leading to dissatisfaction with the project in general:

*“For every litre, they deduct one hundred shillings. It means every month they deduct almost 220,000 shillings from our payment. Now it would have been better for us to pay them forty five thousand shillings rather than having such a deduction. As mothers, our aim is to rescue ourselves from dependence on our husbands. We’re generally paid seventy five [thousand shillings] in a month, for example, if the price rises, we might get one hundred thousand. Does it satisfy our needs? Now, sometimes when we sit in our meetings, we ask ourselves about the fridges. Maybe we have to pay for them. Have we really gotten rid of poverty, have we improved our economic status? It is a great sum. [...] We have hope, but we aren’t happy with the job we are doing now.” Rehema, kitchen worker*

The project intended to give ownership of the kitchens to the communities in which they are based, which is why the kitchen groups mostly grew out of existing local women’s or youth groups in the community, who often participated in other development projects. Kivulini is an anti-domestic violence and women’s rights group founded more than ten years ago in Mwanza, and its original founders have maintained a

‘hands off’ philosophy. Kivulini helped start the probiotic yoghurt project, and exists as an example for those involved in the project:

*“Kivulini [for example], it belongs to the community, because today if you look at those people [the founders of Kivulini], they are all not there, other people took on those leadership roles. Why didn’t they say that ‘we are the founders, we introduced this project, and therefore it is our property’? They didn’t, and that’s why even if the director of APYN tried to claim ownership of the kitchen, I would nonetheless step aside and give the wheel to my fellow citizens. As I go I would say ‘you can bear a child but that child isn’t yours, it belongs to the community’” Abasi, kitchen worker*

However, despite this example, many of the kitchen workers lack a sense of ownership:

*“The main goal for the kitchens is for the community to own this project, but they aren’t.” Cyril, APYN staff.*

There is perhaps a certain sense of dependency on APYN and WHE. Contributing to this, the project goals may be articulated unclearly to its participants:

*“The problem with the kitchens is that they feel that APYN owns the business, so they don’t work as if the business is theirs. [...] If they want to succeed, they have to cooperate with one another and work very hard.” Diana, APYN staff*

*“If they don’t understand what I tell them about ownership, then it’s really not going to work. It’s important that they know the project, what it means, and what they need to do, but they still depend heavily on APYN, which is making them not take collective measures, because each time they want to do something, they still think of APYN in terms of what we can do for them, like even looking for markets for them.” Andrew, APYN staff.*

Furthermore, according to Cyril, *“everyone depends on the funds from Western.”* The project is in a tenuous position. The dependency on APYN not as a ‘network umbrella’ but rather as an overseer/management with direct influence, is not necessarily explicitly in line with the project goals, and is perhaps inescapable at least because of the specificity of the project’s product. The yoghurt uses a specific probiotic developed at the

University of Western Ontario (GR-1, see Wenner 2009; Anukam et al. 2008), which means that it can only be obtained through APYN and its partnership with NIMR Mwanza (National Institute for Medical Research). APYN delivers this probiotic in weekly installments over a two day period to all kitchens. However, if the funding runs out, or APYN ceases to exist, kitchens will be in a difficult position, especially in terms of distinguishing their product from others and continuing on as a business:

*“They think that they will always be able to depend on APYN, but if APYN fails, they will fail too, because they are dependent on APYN and they think that the business is APYN’s and not theirs. That’s the problem [dependency]. We keep on telling them ‘this business is yours and you have to work hard and cooperate so you can benefit’ [...] I’ve made it a habit to tell them this every day, that they have to feel and understand what they are doing so that they can succeed. But they don’t care. They don’t care at all. So for the mamas you sometimes can’t give them advice, because they think that since I’m the same age as their daughter I’m trying to control them. [...] Some kitchens, like Sayuni, Tukwamuane, and VSI, they can continue without APYN, but there are some kitchens who cannot” Diana, APYN staff.*

There are worries that the kitchens may not attract enough paying customers to sustain both their costs and members’ incomes. Receiving funds almost unconditionally from Western for providing yoghurt to the beneficiaries may be a part of this:

*“Apart from the 75 beneficiaries, they are also to sell more to other customers to ensure that the kitchens can make more money.” Andrew, APYN staff.*

Despite current challenges, the project is helpful to many of the kitchen workers, and should be sustained, similar to local experiences in Sin’s (2010) analysis:

*“The project is very positive to them [the women]. I can see that, and I have learned a lot of things from them ... you know, many of these mamas and youth had nothing to do at all before the project started.” Janet, APYN staff.*

Empowerment is not an end product but a process which results in meeting strategic gender needs (Smyth 2007). Furthermore, the APYN staff are sensitive to the backgrounds and progress of the kitchen workers:

*“Most of the kitchen mamas and the youth members came from situations of domestic violence, so they were earning nothing [...] now they are getting real wages. To most of them, their wages are fair. [...] They are becoming empowered. I can see that in the past year since I started working here. Their thoughts, their goals, their objectives, they grow every day.” Cyril, APYN staff.*

When asked about where he saw the future of the project, Cyril continued:

*“I want to see APYN in more of a supervisory role rather than as an ‘owner’ of this project. I want to see more kitchens; I want to see more people drinking the yoghurt for free [...] Western as the main source of [funding to] this project to Tanzania should work with other organisations, not only APYN. There are so many organisations here working with people with HIV. [...] I want to see probiotics in hospitals; I want to see probiotics in the shops; I want to see more people getting it for free, more beneficiaries, and those people, who like I, have a job, who can afford to buy it, will buy it and that cash will go to the community. Yeah, that’s what I want [...] like a collective. ”*

### 4.2.3 Making Money

Many of the kitchens have come up with other schemes for making money, such as selling snacks or tea, but this is supposed to be forbidden under the terms of the contract they signed with APYN. Some of the workers have prior experience in selling these things either as a part of another community group, the same group that is running the kitchen, or on their own. Some are still running these businesses separately. It would seem, though, that selling tea (chai or chai masala, a spiced tea) and snacks, such as maandazi (fried dough), ugali (a sort of flour porridge), chapatti, and vitumbua (fried rice cakes), all of which are commonly sold as street food, is lucrative. These items are commonly eaten alongside yoghurt; I often observed people bringing these types of snacks to have with their yoghurt in the kitchens. Kivell and Shaw (2012) suggest that

retail customers are attracted to locations by the business itself, coincidence (foot traffic), and most importantly, ‘shared business.’ Co-located businesses with complementary products attract more customers, and as some of the kitchen groups plan to open a second location nearby for this purpose, their customer base may grow. While it is understandable these items are forbidden in the kitchens to avoid contaminating the probiotic yoghurt, a better approach to allow these sales may be useful in sustaining the kitchen. This could help by attracting more paying customers, as well as masking the HIV/AIDS elements of the project (see 4.2.6).

*“Many people come asking, ‘do you have tea here?’ and we keep on telling them we don’t, so now we are thinking of preparing some tea and snacks. We thought that it might not be possible because it is not easy to have two businesses; I mean selling tea and milk together won’t be possible. They [APYN] said that you cannot sell milk and tea together, you cannot do two things at a time.” – Mercy, kitchen worker*

Selling other products alongside the yoghurt and expanding the business is a dream for many of the women:

*“When we can open a hotel [in general, a hotel featuring guest rooms and a restaurant], we will. Also many people have been asking us about ugali. [...] We will look for a room somewhere else, and this one [room] will stay here for producing yoghurt, and then the other place will be only for ugali, tea, and so on. This room will then just be a place to prepare yoghurt. Before distribution, we are not allowed to sell ugali or tea from this room. We are allowed to sell the milk when we’ve finished preparing it, when the milk is already turned to yoghurt, we can take it to the hotel. [...] People eating ugali from elsewhere come here to buy yoghurt to eat with it..” Neema, kitchen worker*

In order to make more money, the yoghurt is often taken to the market, but there are difficulties in doing this. The kitchen workers are aware of the markets around town (there is one sheltered market and several open air food markets); the main issue is transporting the milk there in larger amounts, which in part is a problem because of the lack of packaging:

*“Those taking the milk to town face the problem of transporting the yoghurt to the market. Instead of selling forty, thirty, or twenty, they take very few litres of milk. One can go with ten or with eight litres [...] only eighteen litres of milk in all. [A solution could be] if we can get some packaging to pack the milk before distribution.”* Rehema, kitchen worker

However, another problem is pointed out by an APYN staff member, Cyril, in that *“most of the kitchens aren’t producing enough to finance commercial packaging.”*

It is certainly an economic challenge with lack of market, the cost benefit of packaging become a problem.

#### 4.2.4 Packaging of Probiotic Yoghurt

Packaging was overwhelmingly the most desired improvement for most kitchen workers, customers, and APYN staff.

*“The challenge that they face, for all ten kitchens is that they don’t have packages. Yeah, that’s what they [customers] keep asking me for...”* Diana, APYN staff

*“We should have some packaging, because we supply to different areas.”* Ali, kitchen worker

*“We don’t have any packages but if we get them we would have a bigger business.”* Nuru, kitchen worker

*“We used to send [milk to NIMR], but the problem is packaging. [...] As far as they [workers at NIMR] are concerned, they do not want to have it in glasses right there, they want to take the yoghurt home. Some want to keep it in their offices for later, thus you cannot give this person yoghurt in a glass.”* Janet, kitchen worker

*“However, the most important thing is to have the packages, then it is not necessary to rent a room in town.”* Rosemary, kitchen worker

One kitchen in particular (Tukwamuane) already had received a packaging machine, but had run out of the packages, and as indicated in the comment below, This is negatively affecting their business:

*“We have already talked with them [APYN], and they said that they are preparing packaging for all the groups. We thought that they are taking a long time. We are in the process of sourcing our own packages, so that we can continue packing yoghurt. They should continue with their strategies in order to make sure that all the groups have the same packaging. They didn’t agree. They don’t want to give us the packaging, rather they want to wait until they can provide it to all groups. And we realized we are losing our clients because of the delay. Thus we thought that it is better we have our own packaging while waiting for their plans.” Mariam, kitchen worker*

The participants were asked about the availability of packaging locally, since this is an important component of the economic sustainability of the kitchen. The participant replied that it had to be obtained from Nairobi, in Kenya, which is approximately 700 km away from Mwanza. Such a journey would comprise around 30 hours of travel time, and 30,000 Tanzanian shillings (\$CA20) in travel cost alone. Kitchen workers were suspicious about APYN’s motives in monopolising the acquisition of packaging:

*“They said that they would be the ones going to buy the packaging from Kenya, and then that we should buy the packaging from them [...]. That means they will sell them to us, rather than giving us the packages for free so that we can do our job well. What made us appreciate them is that they came to us to help us improve our financial status, but they are forcing us to buy packaging from them. Honestly, we are not happy about that. [...] The problem is that we need someone to help us source packaging on our own, and we do have the money to buy the packaging” Mariam, kitchen worker*

Another worker at the same kitchen weighed in on the packaging issue:

*“There are many problems we didn’t expect to face, especially this one. [...] Before they started the process, they should have told us that they were not ready to give us the packaging, they are just lying to us now.” Aisha, kitchen worker*



Other kitchens have also experimented with packaging yoghurt and milk in re-used containers, such as water bottles or jars:

*“Our weakness is the amount of yoghurt we produce; our business suffers because we don’t have packaging. Someone may come to buy milk, and if you ask him for a container to put the milk in, he may not have one, and will instead ask for packaged yoghurt. Since we do not have packages, and if we have no [reused plastic water] bottles, we cannot sell him any. Some do not like this while others are ok with it. Sometimes we pack the yoghurt in plastic, and some people will postpone buying milk until they have a container.”*

*Rosemary, kitchen worker*

Most customers when asked were generally satisfied with the state of affairs at the kitchen, and would not make any changes, though many would like the yoghurt to be properly packaged:

*“Some changes that I would make is have packaging for those who come to buy yoghurt but don’t bring their own container.” Hamisi, customer*

Packaging is seen as the key to becoming a successful business, and according to Ho (2005), customers of a higher socioeconomic status are more likely to buy it.

*“If milk is in packaging, it sells itself.” Anna, kitchen worker*

#### 4.2.5 Marketing and Customer Feedback

Despite yoghurt becoming increasingly accessible in Mwanza supermarkets, many Tanzanians do not consume yoghurt and other processed dairy products on a regular basis or at all (TNBS 2011). Some customers I encountered at the kitchen only drank milk there, citing an unfamiliarity with yoghurt. Furthermore, there is a distrust for ‘exotic cows’ and supplements, and some kitchen workers cite an underlying conspiracy:

*“Yes, we have had some success, because we try very hard to care for these people [the beneficiaries], because they made us find this place, because for outsiders [non beneficiaries] we can take the yoghurt to them. They like it because our yoghurt is of good quality. Because our product is quality, even outsiders come to buy from our*

*premises sometimes. For beneficiaries, however, since we started supplying them with yoghurt, the majority have seen improved health, and they have also gained weight. Some have also come to confess that; ‘we thought that you are freemasons when you supplied us the first time, for so many years my weight hasn’t increased, but now [since starting probiotic yoghurt], my CD4 count has increased a lot. They thought we were freemasons because....you know it is so difficult here, life is tough, and people are wary when someone offers yoghurt for free, and that person is in a group. They think that since we’re a group, and we give them yoghurt for free, that later on that we will sacrifice them, but obviously, that’s not true.’ Faida, kitchen worker*

When a high quality product is available, though, most customers will buy from the APYN kitchens rather than other competing businesses in the area. However, the probiotic yoghurt is not well distinguished from other products beyond that. As one of APYN’s goals is to create public awareness around the health benefits of probiotic yoghurt specifically, more marketing on their part may be necessary. Some kitchen workers do find it difficult to communicate the advantages of probiotic yoghurt, and may need more education to help explain it:

*“[Clients ask us] how do you add the supplements, and what are they? We tried to explain it to people, but clients find it hard to understand. [...] We need more training, because they are asking tough questions. If we are given good training and get good knowledge, we could answer them. Some clients laugh when I try to educate them, but in any case, we keep on insisting that they shouldn’t miss coming here for yoghurt, and we make sure that there is yoghurt available for the beneficiaries. People’s health improves when they drink our yoghurt. [...] We just have to cope with them [new customers]; soon they will understand the benefits. You have to look at the number of people coming too, about seventy five people come to us every day. They say that their health has improved. They do buy yoghurt, but we fail to convince the society surrounding us to come in and have a glass of yoghurt. Those who come here every day learn from us, and when they learn, they will help us to educate other people, this is the next step, but as for me, we are doing well just with them. Sometimes we fail to answer their questions, though.” Dalila, kitchen worker*

One worker suggests that marketing could be the solution to the problem of uninformed customers, and insists on the quality of her product. Milk can often be diluted with water and this is commonly known by most (see Omoro et al 2004). This can lead to poor product perception:

*“My problem is that our yoghurt hasn’t been marketed. We were promised that they would take the responsibility of marketing yoghurt around Nyakato [an area of Mwanza just outside the city centre]. Therefore our yoghurt isn’t understood by the people, and they don’t understand why it is important. Therefore potential customers think our yoghurt, and the milk that is sold in streets, packed in [water] bottles are the same thing. And so the only people who come are those who know the importance of the milk, especially those who are educated [...]. Many have found our yoghurt incredibly thick, and of the highest quality. It was confusing to them, why our yoghurt is so thick, or what is mixed into it, what we put into it, but our milk has cream, you see, making our yoghurt better.” Rehema, kitchen worker*

Echoing her colleague, Mkiwa proposes a solution:

*“We have also asked for brochures; so that we can distribute them around our town, and tell people the importance of yoghurt to human health” Mkiwa, kitchen worker*

Kitchen group members are willing to help with marketing work. APYN staff have acknowledged the problem of marketing, in that the product is not well known in Mwanza. Some locals who were asked about the kitchens at nearby markets were not aware of them or their product. Furthermore, according to the Tanzanian National Bureau of Statistics (2011), only 12.1% of women in Mwanza with children under three at home consume dairy products including yoghurt regularly. Dairy products, especially processed or fermented products are relatively uncommon in markets in Mwanza.

*“People in Mwanza, they don’t even know the kitchens are there.” Cyril, APYN staff.*

Despite this, the yoghurt is well reviewed by customers, some of whom come everyday as part of their routine:

*“There is a difference, and this yoghurt we get here is thicker than the milk that comes from these cows... the exotic cows!” Omar, customer*

*“That kitchen is good and I would like this project to come to our neighbourhood too, so that they can produce more yoghurt, because here, if you look at these people [the kitchen workers], they are very clean. Their yoghurt is of high quality. That’s why in most cases I prefer coming here to any other place. They say ‘what you like is what your heart likes.’ I’d like to thank the sponsor, and would like them to expand the project so that it can cover a large area.” John, customer*

*“I am a bodaboda [motorcycle taxi driver], I ride a motorbike all day, therefore because of the dust, I’ve been advised to drink half a liter [of yoghurt] every day. I have one glass of yoghurt in the morning and one in the evening. Such milk...you know this yoghurt, I’ve been told that natural milk is good. It makes me feel well and cleanses the dust out of my system.” Clemence, customer.*

Beneficiaries have also extolled the benefits of the yoghurt, and take great pains to avoid missing their daily dose, even if it means walking long distances or spending extra money on transport:

*“I mean even me, I am healthier, and I have the power to do my daily errands” Lucy, customer*

*“In fact, since we started drinking yoghurt here, [our] CD4s have risen. Our weight wasn’t good before we started drinking yoghurt, but we’ve all gained weight, even me! It is true that sometimes we used to be very tired. Sometimes if we feel like that day won’t be good for us, we have to take a daladala [bus] so that we can come have our yoghurt early.” Dorah, customer*

For some who have been beneficiaries of the WHE yoghurt project, they would ask for more yoghurt than is given:

*“At the time we started serving the beneficiaries, some of them did not understand when we told them that we are only required to give them a quarter of a litre, and this made*

*them sad. They were lamenting a lot, claiming that we give them too little, and that we should increase it to at least half a litre. We told them that that is the size that we are required to give them, and we asked them to be satisfied with that. Some understood, but some are still not satisfied even now. We just keep telling them that it is what we have been directed to give them, one cup every day, and that it is impossible to get two cups of milk. One cup of milk is enough.” Neema, kitchen worker*

Despite the difficulties they face, some women’s group members are strongly motivated by a desire to do good in society:

*“What motivated me to participate in this project is because I am an activist and I want all people to have peace. When I find something good is being done, I do not hesitate. What motivated was because the project targeted those people who are affected [by HIV], and I found that it was one of the opportunities I could use to provide services to them. This would also make it easy for me to give them advice to prevent new infections, and to help them have a balanced diet.” Irene, kitchen worker*

While not all kitchen workers expressed the same motivation, they nonetheless want to benefit society, as well as improving their own situation, thereby meeting both practical and strategic gender needs (see Chant and McIlwane 2009). Kitchen workers also agree that there should be more beneficiaries, as demand outstrips supply:

*“We have to add five more beneficiaries, so that there will be 80 in number. We did have that number of people before, but there came a time that we had to stop because the budget was too small. However, there are many people who need yoghurt. To date, we managed to serve 75 beneficiaries, but as the yoghurt is helping them, they go and tell their colleagues about us, and those people also tell others.” Irene, kitchen worker*

This is also acknowledged by APYN staff, who all desire to enroll more beneficiaries, but understand that the funding is not available to do so:

*“We wish not to have just 75 beneficiaries per kitchen, but 150. Every day we get new applications from people living with HIV/AIDS, all asking for yoghurt. They are even aware that the project beneficiaries get yoghurt for free, and they know the health*

*benefits. But we have to tell them that the limit is 75 people and we can't even add one person to each kitchen." Janet, APYN staff.*

Some APYN staff are more positive, and suggest self-sufficiency as a means towards meeting the goal of enrolling more beneficiaries amongst others. This of course relies on selling yoghurt to those of higher socioeconomic status, and may require some of the other issues (such as packaging) to be solved first:

*"There's always a way towards everything that you want to achieve. If we need to find funds for people who need to drink this yoghurt for free, we need to serve the yoghurt to people who are of good economic status, and what they buy should go back to the people living with HIV, and thus producing more. Instead of depending on Western, we can do it ourselves. I don't see the logic of depending on someone for too long, you should help yourself." Cyril, APYN staff*

#### 4.2.6 Stigma on the Beneficiaries

Kitchen workers are particularly sensitive to the needs of beneficiaries, in particular, their desire to avoid stigmatisation due to their HIV/AIDS (see for example Amuri et al 2011's work on HIV/AIDS stigma in Tanzania):

*"The [beneficiaries] don't like interacting with other people. They come to have the milk here, since it is busy at the bus stand where we sometimes sell yoghurt, it is hard for them to go there. Most of them feel shame, so it's better to have a place that is private."*  
*Rostam, kitchen worker*

Rostam's colleague emphasises this point, as their kitchen is set on a quiet road, which is nonetheless near a large intercity bus terminal, also known as a bus stand.

*"It is private, that's why people like it." Edward, kitchen worker*

Other kitchens too seek out partially hidden locations in order to make beneficiaries more comfortable, as most people do not wish to reveal the HIV status even if it is that of family members and not themselves (TNBS 2011). A fair proportion of Tanzanians, too, (58%) believe that HIV is a punishment for sinning (Amuri et al 2011):

*“There are few people who like to show their [HIV] status, but as for us, we have been told that we are serving people living with HIV/AIDS, so we know. And many victims don’t like to reveal their status... therefore when we sought this location, we found a hidden area, it isn’t too open, so we took it.” Faida, kitchen worker*

While this is a good strategy for maintaining the privacy of the beneficiaries, it is not necessarily a viable strategy for locating a business. However, Drezner (2006) posits that distance is not as important as attractiveness to the customer, either by having a distinct product or a large range of items. According to Andrew, an APYN staff member, though, the kitchen group’s locational strategy is in conflict with attracting paying customers:

*“If you have a kitchen which is situated far from your customers, then it becomes necessary to deliver the products to the customers every day, and this adds more costs. But if you are in a place that is well situated, close to your customers, it is possible for customers to come to the place, buy yoghurt and take it away, but if you want to stay to drink yoghurt, you can.”*

Further, some kitchens reported having issues with some beneficiaries who felt uncomfortable attending those kitchens, in such case some beneficiaries tend to seek out alternatives:

*“Many moved [here to this kitchen] because they felt stigmatized. Many come here following their colleagues.” Salome, kitchen worker*

There can also be problems with the local population’s perception of those living with HIV/AIDS, requiring some benign but deceptive explanations:

*“There is another challenge. I think that when some of the people see these people living with HIV drinking yoghurt here, they think that it isn’t for them, and that it’s specific for those living with HIV.” Irene, kitchen worker*

*“Some people were coming to ask us, ‘Are you serving HIV positive people? Is this yoghurt for people with HIV only?’ We told them ‘no, we serve the entire community.’ As*

*for the people, if you tell them ‘yes, we serve people with HIV,’ such things have a stigma.” Rosemary, kitchen worker*

The participant was then asked if she thought the community thought the kitchen was a part of it, and whether the community thought that the kitchen was not only for beneficiaries:

*“Yes, because we put off the question. What helped us is that we asked them to look at our logo and tell us if they see the word HIV. If one looks at the logo, it isn’t there. Sometimes someone in a position of power comes asking that question, but we kept on skirting around the fact that that we serve them, because the issue of serving people with HIV first of all is something confidential. Secondly, we noted that many beneficiaries come here at two in the afternoon. We have to use our brain. If a beneficiary has come here to have some milk, she shouldn’t sign the register [beneficiaries have an ID card and must sign for each portion], because they would notice that. She therefore comes to sign next time or later, since if they see her signing the register, they discover that we do serve those with HIV. Therefore we put the beneficiary first, and treat them equal to other customers. That is our secret.” Rosemary, kitchen worker*

The problem of stigmatisation can impact the business side of the kitchen. For example, a relatively large proportion of respondents (34.8% of women; 31.6% of men, see TNBS 2011) would not buy fresh vegetables from someone living with HIV/AIDS. A fair proportion too believe that HIV/AIDS can be transmitted through the sharing of food (15.2% of women, 19.8% of men, see TNBS 2011). Combined with the anecdotal evidence from the kitchen workers and APYN staff, it becomes clear that forthrightness about serving beneficiaries may not be good for the economic sustainability of the kitchens. Relevant too to economic sustainability is that beneficiaries are given their yoghurt for free. Several kitchens, to continue to attract and maintain a paying customer base, employ a system whereby the beneficiaries keep their status secret:

*“We have a way that we use; they just come here as normal customers. Even if someone finds a beneficiary drinking some milk, he can only see that the beneficiary is just a customer like any other. Because the beneficiary doesn’t sign anywhere right away, they*



*usually come during the evening when we are about to close or even early in the morning when we are opening. We do tell the beneficiaries that when they come to behave like any other customer. If someone asks us why that person isn't paying, we say that he pays us at the end of the month." Irene, kitchen worker*

#### 4.2.7 Other Barriers to Economic Success

Ideal spaces for kitchens are described as having more space, with rooms for each use (production, sales and seating, storage). Attractive spaces attract more business (Drezner 2006). Salome's kitchen has very little space, and they are thinking about moving or expanding:

*"For the best kitchen, there should be a place where clients can sit down and have the yoghurt." Salome, kitchen worker*

Others desire space that is not rented but owned by the group, and therefore more embedded in the community. While purchasing land and building premises is expensive up front, in the long term it saves money. Many of the kitchen workers want to own property collectively:

*"There is one place which is good, as it it's well located, but the problem is ownership. If we had our own big place and built our own office, it would be better, obviously as property of the group, so that we don't have to rent anymore." Agnes, kitchen worker*

However, before addressing the challenges of space and location, other challenges pertaining to capacity should be dealt with first:

*"There are challenges that we face in our daily work. First of all, we need another refrigerator. We have one refrigerator, which is a problem, because we receive many litres of milk and make lots of yoghurt." Rita, kitchen worker*

Other kitchens too mentioned that storage was a problem in terms of the amount produced; without adequate storage space, production is lower. Sometimes, some of the kitchens sell out of their product due to this storage problem. Furthermore, this can cause health safety issues if the probiotic yoghurt produced cannot fit into the fridge; the

product may spoil before it can be sold. Again, packaging could solve this problem as it can be more efficiently stored, and it prevents spoilage better than other methods of storage (Opara and Mditshwa 2013). Competition also is a problem, though the kitchen workers attempt to differentiate their product, and as shown above, customers review it well. Competition may also help raise awareness of dairy products in general in the neighbourhood, as they do not sell the same product:

*“There are challenges in business too. What happens is that when other people see you starting a business, they start the same business as yours. A lot of them just opened their business as we started ours, [but] they sell normal milk.” Dora, kitchen worker*

While copycat businesses were a problem for some kitchens, they can effectively generate more business for the kitchens (see Kivell and Shaw 2012). All of the kitchens stated that they addressed problems within the group effectively, avoiding long term conflict:

*“There must be some minor misunderstandings because if you are living in one house you cannot escape misunderstandings.” Mercy, kitchen worker*

Transport is a major issue for many of the kitchen workers, not only in terms of getting yoghurt to the market (see 4.2.4), but in terms of commuting to their kitchens. Olvera, Pat, and Pochet (2008) found that expenditure on transport for the poorest three wealth quintiles in Tanzania was out of the question except for the most indispensable trips:

*“I mean that’s why it is a bit hard for us, the kitchen is far from our houses; we like our job, but what can we do?” Dalila, kitchen worker*

*“Yes, sometimes you do not have even a cent, and even if you do have some money, you cannot spend it on transport. If you use the money for transport every day, you will essentially be working only for transport money.” Anna, kitchen worker*

*“We do use public transport, daladala a lot, as if you use a bicycle, you will be late. You then delay your colleagues. There is also only one bicycle, while we are five in number.”*

*Rostam, Kitchen worker*

Due to APYN’s existent locative process, which endeavours to locate kitchens in areas underserved by already extant ones, sometimes kitchen groups find themselves establishing their kitchen far from where they live, as there is already a group there. Some workers, such as those at Youth2Youth, must travel from practically in the town centre to the Nyegezi bus stand, which is about thirty minutes or more by daladala. Allowing groups to accept new members from their local area may mitigate this, or even ensuring new kitchens are located within a reasonable distance from where workers live.

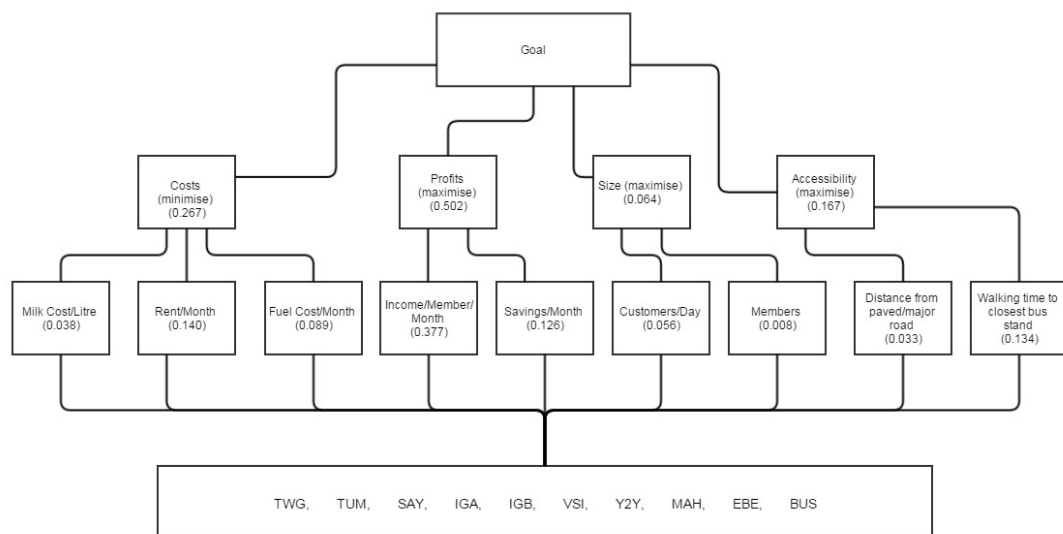
#### 4.2.8 Conclusions

The kitchen groups and APYN face many challenges ahead of them, particularly in the way business is conducted. Firstly, if APYN is truly to be a network, all-kitchen meetings should take place. As of writing, there have been few opportunities in the past three years for the kitchens to know each other: the yoghurt making workshop and the record-keeping workshop are two of those. Moreover, if these skills, recordkeeping in particular, are to be maintained, workshops should continue to take place until accurate records are kept, ensuring a way to properly track how the business is going. Secondly, APYN needs to assist kitchens in setting up bank accounts and ensuring transfer payments from the donor are made on time, to avoid problems with the kitchens, and other problems down the chain with their suppliers. Finding an easier way to make these payments would be beneficial. Threats should not be made in lieu of constructive criticism, and language should be carefully chosen so as not to ‘rock the boat’. It is important to consider the power dynamics inherent in this type of relationship (development projects) and how intent is projected. Communication remains a key challenge as some participants stay away from making constructive criticism for fear of threats. Interns in particular do little to help this, as several of them attempt to communicate in a language the kitchen workers do not understand (English). This causes problems, because while the kitchen groups want to work with the interns and they respect them because they have come all the way to Tanzania, they cannot explain that

they do not understand, leading to things not being done when they are asked. A positive attitude and a willingness to learn from each other is important in progressing the project. New models and protocols should be developed as the context changes. The provision of yoghurt to people living with HIV/AIDS seems a good idea but it has economic implications, given kitchens tend to seek locations that help provide privacy and confidentiality to people living with HIV/AIDS taking yoghurt.

### 4.3 Multicriteria Evaluation

This section will demonstrate, stage by stage, the assigning of preferences to criteria, subcriteria, and alternatives, as well as elaborating on its rationale. Preferences were assigned based on observations made in the field, as well as conversations with kitchen group members, APYN staff, and WHE staff. The analysis was based on the hierarchy developed following Malczewski (1999, see figure 4). Pairwise comparisons were made resulting in a set of global weights (see figure 5 below).



**Figure 5: Multicriteria evaluation hierarchy with global weights**

#### 4.3.1 Ranking Objectives

The first step was to rank the objectives relative to each other (see figure 4 and figure 5): profits, costs, size, and accessibility were compared. Six comparisons were

made (see table 4), resulting in a ranking of: i) Profits (0.5017); ii) Costs (0.2675); iii) Accessibility (0.1671), and iv) Size (0.0637) (see table 5). Profits were ranked most highly due to the project's focus on economic stability – higher profits mean that costs (the second most highly ranked criterion) can be met. Accessibility was ranked third most important over size, as the geography of the kitchens was more highly emphasised by participants – more accessible kitchens mean more customers, and therefore more profits. The criterion weights (table 5) were calculated by dividing the Saaty ranking (see table 3) by the sum of the column, and then averaging those values across each objective for the final weight. A consistency ratio and index were calculated (see equation 2), and were found to be acceptable (CR<0.10 is acceptable).

**Table 4: Pairwise comparison of objectives**

	<i>O1</i>	<i>O2</i>	<i>O3</i>	<i>O4</i>
<i>Costs (O1)</i>	<b>1.00</b>	<b>0.50</b>	<b>4.00</b>	<b>2.00</b>
<i>Profits(O2)</i>	2.00	<b>1.00</b>	<b>6.00</b>	<b>4.00</b>
<i>Size (O3)</i>	0.25	0.17	<b>1.00</b>	<b>0.25</b>
<i>Accessibility (O4)</i>	0.50	0.25	4.00	<b>1.00</b>
<b>Sum</b>	<b>3.75</b>	<b>1.92</b>	<b>15.00</b>	<b>7.25</b>

**Table 3: Objective weights**

	<i>O1</i>	<i>O2</i>	<i>O3</i>	<i>O4</i>	<b>Weights</b>
<i>Costs (O1)</i>	0.27	0.26	0.27	0.28	<b>0.2675</b>
<i>Profits(O2)</i>	0.53	0.52	0.40	0.55	<b>0.5017</b>
<i>Size (O3)</i>	0.07	0.09	0.07	0.03	<b>0.0637</b>
<i>Accessibility (O4)</i>	0.13	0.13	0.27	0.14	<b>0.1671</b>
<b>Sum</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.0000</b>

**Table 4: Consistency ratio for objectives. Lambda = 4.10, CI= 0.03, CR = 0.04**

	<i>O1</i>	<i>O2</i>	<i>O3</i>	<i>O4</i>	<i>Sum</i>	
<i>Costs (O1)</i>	0.27	0.25	0.25	0.33	1.11	<b>4.14</b>
<i>Profits(O2)</i>	0.54	0.50	0.38	0.67	2.09	<b>4.16</b>
<i>Size (O3)</i>	0.07	0.08	0.06	0.04	0.26	<b>4.02</b>
<i>Accessibility (O4)</i>	0.13	0.13	0.25	0.17	0.68	<b>4.08</b>
					<i>Sum</i>	<b>16.39</b>

### 4.3.2 Ranking Criteria

The next step was to generate preferences for the criteria found under each objective. The criteria found under each are as follows: for profits they are income per member per month and savings per month; for costs they are milk cost per litre, rent per month, and fuel cost per month; for accessibility, they are walking distance to a bus stand and distance from a major/paved road; for size, they are number of members and customers per day. The same method detailed in Section 5.8.1 was followed to generate preferences for each group of criteria.

#### 4.3.2.1 Costs

The criteria under costs are milk cost per litre, rent per month, and fuel cost per month. Three comparisons were made, resulting in local preferences of i) monthly rent (0.525); ii) monthly fuel cost (0.334), and iii) milk cost per litre (0.142). Monthly rent was preferred over the other criteria as it is the cost which most kitchen group members cited as troublesome; some kitchens were in the process of finding new premises, though others were not as troubled by rent due to location (those kitchens farther from the city centre and bus stands tended to have cheaper rent) or arrangement (Tukwamuane's building is shared with another organisation who owns it). Several kitchen groups cited either increases in rent or a lack of finances as reasons to relocate premises. Each kitchen group's initial few months' rent was covered by APYN, but perhaps due to earlier miscalculation, some groups have found themselves with rent exceeding what they are willing to pay. Rents paid by the kitchens ranged between 20,000 and 120,000 tsh monthly (CA\$13.25-79.50), though often in Tanzania rent must be paid in yearlong or 6-month blocks.

This was followed by monthly fuel cost, which was also cited as an expensive bill to pay by kitchen members, at least relative to milk cost. The monthly fuel cost variable combined both charcoal and gas expenses: some kitchens used both interchangeably, whereas others relied on one or the other. The analysis aimed to minimise this cost. Charcoal is readily available almost everywhere in Mwanza, whereas gas must be

purchased at sales points operated by the local gas company. It is easier and quicker to use gas to boil milk as opposed to charcoal. Costs varied greatly depending on production – if a kitchen was for some reason or other not producing a lot of yoghurt, then fuel costs are therefore lower. Monthly fuel costs ranged from 5,000 to 110,000 tsh (CA\$3.30-73.30).

Milk cost per litre was cited as a barrier less often by kitchen group members, mostly the dispute lay in the amount paid by APYN to the kitchen groups per litre, rather than the cost paid to the milk supplier. Issues with milk suppliers included adulteration and delays in payment, rather than the actual cost per litre. Milk cost per litre varied between 800 and 1000 tsh per litre (CA\$0.50-0.66). Kitchens are all equipped with lactometers to determine whether the milk has been adulterated or watered down, and if this occurs, the milk is not accepted from the supplier. Milk is usually delivered in plastic jerry cans by bicycle, and the kitchen group members tend to boil the milk straight after it is received, usually in a 40L pot. The weights were considered consistent, with a consistency ratio of 0.03.

**Table 7: Pairwise comparison for criteria under costs**

	<i>C1</i>	<i>C2</i>	<i>C3</i>
<i>Milk cost (C1)</i>	<b>1.00</b>	<b>0.33</b>	<b>0.33</b>
<i>Rent (C2)</i>	3.00	<b>1.00</b>	<b>2.00</b>
<i>Fuel (C3)</i>	3.00	0.50	<b>1.00</b>
<b>Sum</b>	<b>7.00</b>	<b>1.83</b>	<b>3.33</b>

**Table 8: Local weights for criteria under costs**

	<i>C1</i>	<i>C2</i>	<i>C3</i>	<b>Weights</b>
<i>Milk cost (C1)</i>	0.14	0.18	0.10	<b>0.142</b>
<i>Rent (C2)</i>	0.43	0.55	0.60	<b>0.525</b>
<i>Fuel (C3)</i>	0.43	0.27	0.30	<b>0.334</b>
<b>Sum</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.000</b>

**Table 9: Consistency ratio. Lambda = 3.05 CR = 0.05 CI = 0.03**

	<i>C1</i>	<i>C2</i>	<i>C3</i>	<i>Sum</i>	
<i>Milk cost (C1)</i>	0.14	0.17	0.11	0.43	<b>3.02</b>
<i>Rent (C2)</i>	0.42	0.52	0.67	1.62	<b>3.08</b>
<i>Fuel (C3)</i>	0.42	0.26	0.33	1.02	<b>3.06</b>
				<i>Sum</i>	<b>9.16</b>

#### 4.3.2.2 Profits

The criteria under profits are income per member per month and savings per month. One comparison was made, leading to a local ranking of i) income per member per month (0.75) and ii) monthly savings (0.25). Income was preferred over savings as while all kitchens distribute wages to their members, not all kitchens save money every month, and further, income relates more closely to the project's goal of self-sufficiency. Several kitchen workers and APYN staff have cited the additional income as improving their situation greatly, and empowering the kitchen workers to control their own destiny (see section 5.4). Monthly income per member ranged from nothing (at Mahina) to 160,000 tsh (at Tumaini, \$CA106.70). Monthly savings were not kept by all kitchen groups, though it was strongly encouraged by APYN staff. Further, not all kitchens have bank accounts, though staff is also working to facilitate this. Bank accounts would mean that savings are easier and safer to keep, as well as allowing for prompt monthly payments from WHE/APYN. Savings ranged from zero to 200,000 tsh monthly (\$CA0-133.75). Savings allow for self-sufficiency and reinvestment into the kitchen business. The weights are perfectly consistent as there was only one comparison to make (CR = 0.00).

**Table 10: Pairwise comparison for criteria under profits**

	<i>C4</i>	<i>C5</i>
<i>Income (C4)</i>	<b>1.00</b>	<b>3.00</b>
<i>Savings (C5)</i>	0.33	<b>1.00</b>
<i>Sum</i>	<b>1.33</b>	<b>4.00</b>



**Table 11: Local weights for criteria under profits**

	<i>C4</i>	<i>C5</i>	<b>Weights</b>
<i>Income (C4)</i>	0.75	0.75	<b>0.75</b>
<i>Savings (C5)</i>	0.25	0.25	<b>0.25</b>
<b>Sum</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>

**Table 12: Consistency ratio with respect to profit criteria. Lambda = 2.00, CR = 0.00, CI = 0.00**

	<i>C4</i>	<i>C5</i>	<i>Sum</i>	
<i>Income (C4)</i>	0.75	0.75	1.50	<b>2.00</b>
<i>Savings (C5)</i>	0.25	0.25	0.50	<b>2.00</b>
			<i>Sum</i>	<b>4.00</b>

#### 4.3.2.3 Size

The criteria under size are customers per day and number of members. Customers per day was assessed as very strongly more important than number of members (Saaty 1980). This can be easily linked to the success of the kitchen – more customers means more yoghurt sold. This is a criterion because it is strongly related to meeting the kitchens' goals of both providing income to the kitchen workers and providing the community with a nutritional resource. Counts ranged from zero to 320 customers per day. In observing the kitchens during customer interviews, most customers purchased 500mL or less of yoghurt, depending on whether they sat in (in that case, the serving was a glass of undefined volume) or took it out (in that case, in a re-used plastic water bottle). A serving generally costs around 500tsh (\$0.35). The actual volume of the servings is not standardised between the kitchens, and it can vary depending on the size of the glass. Beneficiaries normally receive a small glass, though this depends on the kitchen.

Kitchen groups have varying numbers of members, ranging between four and eleven. Most of the kitchens had constitutions with rules for members to follow regarding attendance and duties, as well as the distribution of profits. The impact of the number of members is somewhat unclear, though it seemed that those kitchens with seven members were those that APYN staff cited would be able to continue without outside assistance;

the value function for normalizing this criterion reflected this. The weights are perfectly consistent as there was only one comparison to make (CR = 0.00).

**Table 13: Pairwise comparison for criteria under size**

	<i>C6</i>	<i>C7</i>
<i>Customers per day (C6)</i>	<b>1.00</b>	<b>7.00</b>
<i>Members (C7)</i>	0.14	<b>1.00</b>
<b>Sum</b>	<b>1.14</b>	<b>8.00</b>

**Table 14: Local weights for criteria under size**

	<i>C6</i>	<i>C7</i>	<b>Weights</b>
<i>Customers per day (C6)</i>	0.88	0.88	<b>0.875</b>
<i>Members (C7)</i>	0.13	0.13	<b>0.125</b>
<b>Sum</b>	<b>1.00</b>	<b>1.00</b>	<b>1.000</b>

**Table 15: Consistency ratio with respect to size criteria. Lambda = 2.00, CR = 0.00, CI = 0.00**

	<i>C6</i>	<i>C7</i>	<i>Sum</i>	
<i>Customers per day (C6)</i>	0.88	0.88	1.75	<b>2.00</b>
<i>Members (C7)</i>	0.13	0.13	0.25	<b>2.00</b>
			<i>Sum</i>	<b>4.00</b>

#### 4.3.2.4 Accessibility

The two measures of accessibility were distance from a major/paved road and the walking time to a bus stand. Walking time to a bus stand was ranked as moderately to strongly more important (Saaty 4) than distance from a major/paved road. Distance from a major/paved road ranged from 2.91 metres to 8893.38 metres. Some kitchens may be close to a bus stand, but far from a major/paved road, such as Igombe. Igombe is very close, however, to the major bus stand for the area, which features intercity and local buses. This means heavier foot traffic (the stand is within sight of the kitchen) despite being almost nine kilometres from a major road. Walking time to a bus stand ranged from 2 to 65 minutes. These times were measured by the researcher on field visits. Bus stands are places where people tend to gather, and being conveniently located by a transit hub is

good for business, as people are more aware of its presence (see for example Horning, El-Geneidy, and Krizek 2008; Woodward et al. 2011).

**Table 16: Pairwise comparison for criteria under accessibility**

	<i>C8</i>	<i>C9</i>
<i>Distance from road (C8)</i>	<b>1.00</b>	<b>0.25</b>
<i>Walking time to bus stand (C9)</i>	4.00	<b>1.00</b>
<b>Sum</b>	<b>5.00</b>	<b>1.25</b>

**Table 17: Local weights for criteria under accessibility**

	<i>C8</i>	<i>C9</i>	<b>Weights</b>
<i>Distance from road (C8)</i>	0.20	0.20	<b>0.20</b>
<i>Walking time to bus stand (C9)</i>	0.80	0.80	<b>0.80</b>
<b>Sum</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>

**Table 18: Consistency ratio with respect to accessibility criteria. Lambda = 2.00, CR = 0.00, CI = 0.00**

	<i>C8</i>	<i>C9</i>	<i>Sum</i>	
<i>Distance from road (C8)</i>	0.20	0.20	0.40	<b>2.00</b>
<i>Walking time to bus stand (C9)</i>	0.80	0.80	1.60	<b>2.00</b>
			<i>Sum</i>	<b>4.00</b>

### 4.3.3 Standardised Attribute Values and Weights

In order to complete the evaluation, the attribute (criterion) values associated with each kitchen were standardised on a 0-1 scale. The values were standardised using the midvalue method detailed in Malczewski (1999, see pp 120-122). Value functions were therefore calculated for each attribute, resulting in the standardised values found in table 19 below (for nonstandardised values, see table 2). Global attribute weights were calculated by multiplying a respective objective weight by its local attribute weight; for example, a local weight of 0.141 for milk cost per litre would be multiplied by the objective weight of costs, which is 0.267, resulting in a global weight of 0.038 (see table 20).

**Table 19: Standardised attribute values for evaluation. C1: Milk cost/L; C2: Rent/month; C3: Fuel/month; C4: Income/member/month; C5: Savings/month; C6: Customers/day; C7: Number of members; C8: Distance from a major/paved road; C9: Walking time to the nearest bus stand**

	C1	C2	C3	C4	C5	C6	C7	C8	C9
BUS	0.000	0.424	0.048	0.052	0.000	0.054	0.000	0.604	0.142
EBE	0.482	0.020	0.024	0.166	0.409	0.288	0.251	0.521	0.500
IGA	0.250	0.000	0.180	0.343	0.409	0.288	0.251	0.856	0.917
IGB	0.000	0.424	0.385	0.343	0.409	0.108	0.251	0.000	1.000
MAH	0.250	1.000	1.000	0.000	0.000	0.000	0.000	0.370	0.000
SAY	0.250	0.220	0.116	0.201	0.274	0.288	1.000	0.679	0.679
TWG	0.000	0.424	0.385	0.343	1.000	1.000	1.000	0.971	0.791
TUM	1.000	0.424	0.276	1.000	0.000	0.288	0.251	0.966	1.000
VSI	1.000	0.220	0.000	0.023	0.000	0.108	0.193	1.000	0.917
Y2Y	1.000	0.094	0.385	0.090	0.082	0.054	0.251	0.928	0.917

**Table 20: Calculating global attribute weights**

OBJECTIVES		CRITERIA	Local	Weights
<i>Costs (O1)</i>	<b>0.267</b>	<i>Milk cost (C1)</i>	0.141	<b>0.038</b>
		<i>Rent (C2)</i>	0.525	<b>0.140</b>
		<i>Fuel (C3)</i>	0.334	<b>0.089</b>
<i>Profits(O2)</i>	<b>0.502</b>	<i>Income (C4)</i>	0.750	<b>0.377</b>
		<i>Savings (C5)</i>	0.250	<b>0.126</b>
<i>Size (O3)</i>	<b>0.064</b>	<i>Customers per day (C6)</i>	0.875	<b>0.056</b>
		<i>Members (C7)</i>	0.125	<b>0.008</b>
<i>Accessibility (O4)</i>	<b>0.167</b>	<i>Distance from road (C8)</i>	0.200	<b>0.033</b>
		<i>Walking time to bus stand (C9)</i>	0.800	<b>0.134</b>
			<i>SUM</i>	<b>1.000</b>

#### 4.3.4 Final Rating and Ranking

The standardised attribute values (table19) and global attribute weights (table 20) were combined using the simple additive weighting method. Specifically, the overall value (rating) for each alternative was obtained by multiplying the global attribute weights by corresponding standardised attribute values; and then the resulting products were added (see table 21). Based on the overall values, the alternatives (kitchens) were ranked. Table 21 shows the following rank-ordering of the probiotic yoghurt kitchens : 1) Tumaini; 2)

Tukwamuane; 3) Igombe; 4) Igoma; 5) Sayuni; 6) Youth2Youth; 7) Mahina; 8) VSI; 9) Ebeneza; 10) Buswelu.

**Table 21: Final ranking of kitchens; C1: Milk cost/L; C2: Rent/month; C3: Fuel/month; C4: Income/member/month; C5: Savings/month; C6: Customers/day; C7: Number of members; C8: Distance from a major/paved road; C9: Walking time to the nearest bus stand**

Kitchen	C1	C2	C3	C4	C5	C6	C7	C8	C9	OVERALL VALUE	RANK
Buswelu	0.000	0.059	0.004	0.020	0.000	0.003	0.000	0.020	0.019	<b>0.125</b>	<b>10</b>
Ebeneza	0.018	0.003	0.002	0.062	0.051	0.016	0.002	0.017	0.067	<b>0.239</b>	<b>9</b>
Igoma	0.009	0.000	0.016	0.129	0.051	0.016	0.002	0.029	0.123	<b>0.375</b>	<b>4</b>
Igombe	0.000	0.059	0.034	0.129	0.051	0.006	0.002	0.000	0.134	<b>0.416</b>	<b>3</b>
Mahina	0.009	0.140	0.089	0.000	0.000	0.000	0.000	0.012	0.000	<b>0.251</b>	<b>7</b>
Sayuni	0.009	0.031	0.010	0.076	0.034	0.016	0.008	0.023	0.091	<b>0.298</b>	<b>5</b>
Tukwamuane	0.000	0.059	0.034	0.129	0.126	0.056	0.008	0.032	0.106	<b>0.551</b>	<b>2</b>
Tumaini	0.038	0.059	0.025	0.377	0.000	0.016	0.002	0.032	0.134	<b>0.682</b>	<b>1</b>
VSI	0.038	0.031	0.000	0.009	0.000	0.006	0.002	0.033	0.123	<b>0.241</b>	<b>8</b>
Youth2Youth	0.038	0.013	0.034	0.034	0.010	0.003	0.002	0.031	0.123	<b>0.288</b>	<b>6</b>

## Chapter 5

### 5 Discussion and Conclusions

This thesis set out to meet the research objectives, namely to examine the perceptions of the probiotic yoghurt kitchens in the context of economic sustainability, and to examine the locational decision-making process. Section 5.1 will primarily address the first objective, and 5.2 will primarily address the second. In this chapter, the goals and sustainability of the WHE project will be discussed, as well as the linkages between the multicriteria evaluation and the research objectives.

#### 5.1 Perceptions of Kitchens in the Context of Economic Sustainability

The parties involved in this project all follow the same two objectives of the WHE/APYN project as a whole – to provide people living with HIV/AIDS (known as beneficiaries) with free probiotic yoghurt daily, and to provide the kitchen group members with income and a sustainable business. Furthermore, the profits from the kitchens are expected to eventually move the women out of poverty, empower them, and with some profits being funneled back into the beneficiary element. Economic sustainability is therefore the primary focus of the project as a whole, but the results here show this is challenging. Several elements of the project seem to have been conducted ad hoc, particularly kitchen site selection, though this is a characteristic of most development projects using volunteer labour at onset (see Sin 2010). Unlike in other development projects (Sin 2010), the WHE/APYN project has not excluded locals from site selection processes. In all cases, kitchen group members find sites and then the local APYN staff assess the site's suitability. Nevertheless, it is within this arrangement that I examine the decision-making processes and the potential sustainability of these kitchens. The interactions between local staff, kitchen group members, beneficiaries, and (Canadian) interns serve to build the project, though communication between these groups seems not without problems.

For example, several interns have been sent from Canada in order to find ways to achieve economic sustainability, however, they often repeat the same task as previous interns with little temporal cohesion and progress. Each intern tends to repeat previous data collection and analysis, and this has not resulted in significant progress in terms of sustainability. WHE has relied on sending interns to Tanzania to facilitate the economic sustainability of the yoghurt kitchens, but the findings here suggest their motivations are often unclear to not only local staff and group members but to the interns themselves. Consistent with earlier work, this can be an issue when sending organisations do not communicate goals clearly with locals and interns (Raymond and Hall 2008). The types of work undertaken by the interns must also be carefully considered, as well as whether this undermines local staff and capacity building opportunities for local people; having interns culture probiotic bacteria is useful, but a local employee could also conduct this task. Ambiguity in terms of the role of the interns is not ultimately productive (Devereux 2008). For interns to be effective, they should have knowledge; the capacity to reflect; appropriate skills and qualifications; volunteering and international experience; time to get involved with locals; altruistic intentions (Palacios 2010), and, probably most importantly, openness to new experiences.

Additionally, while the WHE internship experience allows for an exploration of the 'other' and for attempts to take an active role in development, repetition of the same activities and a lack of clear roles can lead to disillusionment, and, rather than engendering a deeper understanding of other cultures, confirmation of previously held ideas can occur (Simpson 2004; Raymond and Hall 2008). Consequently, the prioritisation of WHE development and sustainability goals over all else can reinforce this disconnect (Palacios 2010). Simpson (2004) argues that young, unskilled international labour is not necessarily a viable development solution. This argument resonates with the findings from this study that although WHE consistently ensures interns are in Tanzania to facilitate the growth of the yoghurt kitchens, there remain obvious challenges that need to be addressed.

Interns project good intentions, maintaining certain mythologies of development, and adding to their own personal hagiography. This conflicts with the stated goals of the

project, as prioritising an intern's needs and desires over that of the locals can lead to confusion or disillusionment on the part of the locals (see 4.2.1). Locals in Sin's (2010) research in Vietnam did not judge them too harshly, though they found it difficult to communicate with interns due to the language barrier. Sin (2010) also found an implicit perception among locals about students from highly regarded universities, leading to high expectations on the part of the locals for valuable insights and advice for improving their projects, despite the volunteer lacking that level of capacity. Stress occurs on both sides, as the volunteer feels pressure to contribute according to expectation and the local may feel that the costs of hosting interns can be too great (Sin 2010). Potential problems of all sorts need to be taken seriously, as they can destabilise development efforts (Devereux 2008). Interns are transient, and it is easier for them to leave their problems behind for other to clean up. If problems occur, they can have negative effects on the economic sustainability of the kitchens. Communication between interns and kitchen workers in particular was cited as an issue by kitchen group members, as often APYN staff rely on interns to pass on messages or assist groups with a variety of tasks, when their language skills may not be sufficient. In order to avoid this, attention should be paid to clarifying interns' roles and the expectations of them. Focusing on technical cooperation with local ownership can help build capacity locally, rather than reproducing power hierarchies, though care must be taken not to engender dependence on this sort of assistance (Devereux 2008; Sin 2010). This is best for both intern and local, as a 'volunteering' rather than 'development aid' approach to university-volunteer development projects has been found to be more effective (Simpson 2004). The roles of the intern in the APYN project must be made clearer so that they assist kitchen groups in reaching economic sustainability on the groups' terms, not on the interns'.

Given the broader objectives of WHE and the kitchens, the focus needs to be on the problem of self-reliance in order to drive the sustainability and economic expansion of the kitchens. According to Binns and Nel (1999), local economic development is generally cost effective (important as funding from foreign donors will soon end) and empowers the community to make decisions and control local resources and initiatives. Some of the kitchen group members expressed a feeling of lacking control or missing information and even disillusionment with the project. This has mostly been due to a



misunderstanding of the project's goals and parameters. The issues raised during this study calls for more active involvement of locals and open sharing of project goals, benefits, and the evaluation of programmes is important in terms of success (see Sebele 2010). To sustain the kitchens, local community participation must be mutually satisfactory and reinforced by two-way communication and shared expressions of power (Sebele 2010). Decision-making should be representative and leadership should be accountable, especially in cases of disagreement (Sebele 2010; Binns and Nel 1999). The benefits of the project should be distributed clearly and openly in order to avoid disagreements and conflict. This is important in the case of the probiotic yoghurt kitchens, as many kitchen group members do not seem to understand the ownership of the project, nor its intended economic objectives. Indeed, this study has found that communication is one of the most important aspects of a development project. Information is not always shared between kitchens and APYN: for example, the members of one kitchen refused to share their books and benefit distribution scheme, however, APYN staff did not seem to share ideas about centralising production or at least packaging with kitchen group members, though not all APYN staff shared this idea. The costs and other challenges of a project can outweigh the benefits in the minds of participants, even if they technically do not.

Project ownership can be directly linked to its sustainability. Yet this has been an issue within the kitchen groups, with some expressing a lack of understanding about who owns the kitchens. This lack of ownership is then translated into a total dependence on APYN even for the trivial. Not all seem to understand that they own and must run their kitchen, and not to depend heavily on the aid of APYN and the monthly beneficiary payment. Proactive participation is necessary for economic success, and this can be brought about with a clear emphasis on the ownership of the kitchens (Sebele 2010). This can take time, however. For example, a relatively successful (goats' milk) yoghurt project exists in another region of Tanzania. An agricultural cooperative produces the yoghurt, and it grew out of a dairy goat project in 1993, and they began to produce yoghurt in 2007 (Lie et al 2012). By 2010, profit was already generated, though it has yet to be distributed amongst cooperative members despite clear guidelines for its division (Lie et al 2012). For projects like the kitchens in Tanzania, power tends to be concentrated

among the participants that coordinate market activity, which may account for issues in profit sharing (Lie et al 2012; Sebele 2010). Consequently, the perceived uneven distribution of power between APYN and the kitchens could explain some of the difficulties the project is facing. Similar issues were found in a women's agricultural cooperative in South Africa, which eventually turned a profit despite facing similar communication issues, and due to their feelings of empowerment and ownership, members felt a strong sense of achievement (Binns and Nel 1999). Power sharing helps build the capacity of members (Allen 2003). Sharing power, and therefore sharing capacity, is important to empower the kitchen members, and facilitate sustainability. In other words, they should be able to decide their role in the enterprise, and then the capacity to fulfill this role should then be facilitated by APYN. Both APYN staff and kitchen group members expressed a desire for more education in entrepreneurial skills. Although there was a workshop in early 2013 to teach bookkeeping, as expected problems with retention means there is a need for occasional refresher courses, as these would greatly benefit the members. It will be prudent to ask the kitchen groups to suggest some of the topics of interest for such refresher courses. Communities and individuals can identify, implement, and manage a sustainable, self-perpetuating local economic development project and thereby improve their own socio-economic conditions and determine their destinies (Binns and Nel 1999). Engendering a sense of ownership would certainly help APYN's kitchen groups; it should be strongly emphasised whenever possible.

One of the main challenges to the economic sustainability of the kitchens is how to handle the beneficiaries (people living with HIV/AIDS who come daily for yoghurt). The kitchens go to a greater extent to protect the confidentiality of people living with HIV/AIDS, and also to avoid both the beneficiaries and the kitchens being stigmatised by the local communities. The problem here is that if the local community members view kitchens as 'places' for people living with HIV/AIDS, they will avoid visiting the kitchen and buying the yoghurt. Hence, it is important to gain the trust of the community. This has proved to be a huge challenge for kitchens in the marketing of the probiotic yoghurt. Invariably, maintaining a deception, or rather a careful omission, is proving to be taxing on the women in the kitchens. It does seem necessary though, as kitchen group members

at each kitchen mentioned the necessity of hiding the beneficiary program from the community at large in order to draw potential customers (see Results). Generally, people in the Mwanza area would not, if their relative was living with HIV/AIDS, make that known to the community (TNBS 2011). Even those on the national antiretroviral treatment program in Kisesa (an area in the greater Mwanza region) maintain that they are bewitched by what the Sukhuma (the majority local ethnic group) call *kondela*, a condition which mimics exactly being HIV positive, and therefore manage to go about their daily life free of hassle or stigma (Roura et al. 2008). Perhaps then, explicit patronage by people living with HIV/AIDS is a barrier to success, due to stigma. The issue of how to deal with the beneficiaries while focusing on the economic viability of the kitchens has emerged as an important puzzle, whereby development projects aiming to maintain a duality of benevolence and profit making can be confronted with contextual complications.

The similarities between probiotic yoghurt and other milk products in the local market has also resulted in potential marketing challenges in the yoghurt kitchens. When interviewing customers, I encountered several who did not understand the difference in product. Repeat customers valued the high quality of the milk and yoghurt at APYN kitchens; it is all about the product. Milk is often adulterated with water in Tanzania (see for example Omore et al 2004), but the kitchen groups were supplied with lactometers and will refuse to accept milk that is too watery. This insistence on quality supplies can only help the kitchens, though in order to gain more customers, perhaps a unified marketing strategy is required, as well as an education campaign to explain the benefits of probiotic yoghurt. Aggressive marketing in the surrounding neighbourhood is important to gain customers, particularly for this type of product (Lie et al 2014). Furthermore, the availability of the product is important – if the availability is irregular, this may tend to discourage some customers. This can be exacerbated by supply issues with the milk, as it may not always be of the best quality.

Milk is mostly delivered by bicycle or on foot in Tanzania (Omore et al 2004). According to Omore and colleagues (2004), yoghurt formed less than 1% of what market retailers of milk sell in Tanzania, and other types of sellers (such as cooperatives and

hawkers) were not found to sell yoghurt. Yoghurt consumption was also not found to be particularly common by the National Bureau of Statistics (TNBS 2011). For a number of reasons, such as rudimentary transport systems, the perishability of milk products, lack of electricity and equipment, and the seasonality of milk production, establishing an effective and sustainable dairy sector in sub-Saharan Africa has proven difficult (Mdoe and Wiggins 1996). Furthermore, as found by Njarui et al (2011) in Kenya, as the degree of processing of the milk increases, the frequency of consumption decreases, though this is also governed by income level (as yoghurt is more expensive) and rural-urban divisions. This may explain why the more rural kitchens in Mwanza do not sell as much yoghurt as those closer to the city centre. Despite Tanzanians consuming less dairy products than their neighbours do, demand is not met by local supplies and milk has to be imported (Lie et al 2012). This was observed in local supermarkets, where almost all processed milk products sold were imported from Kenya; local fresh milk (as opposed to UHT milk) had to be obtained at the market. Marketing is necessary, as customers are not always aware that yoghurt can be purchased locally. The main barriers to regular consumption in Kenya, for example, cited by were price and lack of income (Njarui et al 2011). The prices in the kitchens are seen as reasonable by customers, and certainly they are much better than the price of yoghurt in local supermarkets (usually around 500tsh (CA\$0.35) in a kitchen versus around 2800tsh at its cheapest in a supermarket (CA\$2.00)). Therefore, it is important to raise awareness in local communities in order to improve sales. Cleanliness and hygiene too in dairy businesses in Tanzania increased profits, and many customers expressed a preference for APYN kitchens as they were seen as much cleaner than other producers (Omore et al 2004). Setting the kitchens apart from other copycat businesses through the superiority of the product and the cleanliness of the premises should be a focus of marketing materials.

Packaging is fundamental to a sustainable food system – it carries a product, protects it from adulteration and spoilage, and adds value (da Cruz, Faria, and van Dender 2001). Packaging allows for transport of the finished product and is perceived as better by consumers (Lie et al 2012). Good and efficient packaging is also required if an economic venture like a yoghurt kitchen wants to scale up. In the absence of packaging, the women in the kitchen have resorted to desperate measures such as using old water

bottles and cups. However, there are concerns about hygiene and the cleanliness of these recycled containers. It is in this context that kitchen group members expressed concern about the speed at which APYN facilitated their packaging plan to the extent that an intern and an APYN staff member made a fact-finding trip in June 2013, but no packaging nor machines were obtained, and various plans were debated endlessly at meetings. Nonetheless, recycled containers or containers brought by customers remain the sole form of giving out the yoghurt to beneficiaries and customers. This way of delivery is definitely not going to help with the economic sustainability of the kitchens. If there are no available containers, then customers must sit and drink at the kitchen, which may reduce sales due to inconvenience. Proper packaging also allows for the maintenance of quality and increased food safety, reducing waste and is a key objective in order to create sustainable food systems (Opara and Mditshwa 2013). There has been some concern that the plastic bag type of packaging, chosen for its cost effectiveness, may reduce the probiotic concentration in yoghurt, however, Talwalkar and colleagues (2004) found that the type of (plastic) packaging does not cause any significant decrease in the viability of oxygen adapted versus non oxygen adapted probiotic bacteria. Maintaining the level of probiotic through processing and packaging is important, but it is also prudent to keep concentrations high, as probiotic bacterial concentration can be reduced through digestion (da Cruz, Faria, and van Dender 2001). Choosing the right format of packaging is also important for extending shelf life and reducing exposure to microorganisms, which may cause faster spoilage (Opara and Mditshwa 2013). Inappropriate processing, storage, and packaging can contribute to 25-50% of wasted food in developing countries, so production is only part of the issue; often kitchens would find that yoghurt went bad relatively quickly even when refrigerated, as it is kept in large, plastic buckets. Furthermore, a lack of refrigerating capacity was cited as an issue – if the yoghurt cannot be stored properly, then it will spoil quickly. Proper packaging will make yoghurt easier to store, too.

For instance, customers perception of packaging has been linked to their preference of specific products; it was found once ‘neat and clean’ packaged rice was introduced to the Hong Kong market, consumers preferred it even if it cost slightly more, especially if they could do the rest of their food shop in the same place (Ho 2005). Some

kitchen groups have successfully approached Mwanza supermarkets to supply them with probiotic yoghurt; however, as they ran out of packaging, the deal fell through. Packaged yoghurt can be sold for a much higher price at the supermarket: a 500mL packet of yoghurt from Tanga costs 2,800tsh (CA\$2.00), whereas (approximately) 500mL at the kitchens costs between 500-800tsh (CA\$0.35-0.55). Adding the cost of packaging, which usually comprises approximately 17% of the final price (see Opara and Mditshwa 2013); local probiotic from the kitchens could undercut other Tanzanian and Kenyan yoghurts in the supermarkets and therefore increase sales. Consequently, it is imperative that the packaging issue be resolved as soon as possible and without further conflict. Based on the findings, the centralisation or control of various roles related to the kitchens may be hampering their economic progress. A case in point is the report that the women's group is unable to purchase their own packaging because this has to be done by APYN.

It is difficult too for younger people to give advice to older people. In Tanzania, elders are respected and may take things poorly if they perceive they are being told what to do (see Results, Kirk and Shutte 2004). A certain register of language must be used with elders, and even small gestures or phrases may be interpreted in certain ways (see for example Beck 2003; Oppong 2006; Bongaarts and Zimmer 2002). Despite issues discussed in communicating with the older women, there is a sense of dependency present (as discussed by APYN staff members in Results). Intervention and supervision may help a development project, but they have to be careful to avoid dependency (Langevang and Gough 2012; Moss, Pettersson and van de Walle 2006). Considering the conditions under which these entrepreneurial groups exist is important - context is key (Langevang and Gough 2012; Barrientos and Kabeer 2004). There is no universal model for development, but Binns and Nel (1999) suggest that it be situationally relevant and people-centred, i.e. contextually bound. The dual goals of the APYN/WHE project exist in conflict with one another in some respects, due to contextual issues. The stigma associated with those living with HIV/AIDS have caused difficulties with attracting paying customers, not necessarily because it is known that the kitchens serve people living with HIV/AIDS (which would be, in general, bad for business), but because of their inevitably obscured or out-of-the-way locations. Those kitchens that are closer to markets, bus stands, and centres are generally more successful than those farther away.

## 5.2 Multicriteria Evaluation and Locational Choices

The multicriteria evaluation (MCE) approach took the qualitative findings and quantitative data into account. The MCE method chosen, the analytic hierarchy process (AHP), which uses pairwise comparisons to elicit preferences, was not readily practicable, in terms of how it is normally conducted. Traditionally, pairwise comparison involves a steadily increasing amount of comparisons, depending on the number of criteria; for five objectives and nine attributes, the amount of comparisons would be 190 (Saaty 1980; Harker 1987a). This can be minimized in a number of ways, like using a hierarchy, or Ishizaka's cluster and pivot method (see Ishizaka 2012; Ishizaka and Nemery 2013). AHP was chosen because of how it approaches decision problems: it allows for decision-makers to make detailed input on each aspect of location. It was also selected due to its flexibility, as hierarchies and weights can be easily adjusted. The approach taken to the MCE in this study allowed for participant-generated knowledge that the researcher interpreted through reflective exercises (Kirby 2006). This knowledge creation process, though, involved the researcher as instrument, and for the MCE in particular, as a channel for preferences; the lengthy period over which interviews were conducted and rapport established helped build relationships and understanding (Brodsky 2008; Berg 2008). Participating as much as possible in the everyday at the probiotic yoghurt kitchens and APY allowed for better observation and reflection both in terms of the MCE, and in terms of sense-making, to understand the multiple truths, narratives, and standpoints of the project's participants (Rose 2002, Ezzy 2010).

This continual, critical self-reflection and reassessment of the research figured into the MCE in particular; things that were thought to be important were not considered as such by participants, and their ideas, which differed from initial expectation, particularly ideas of what it is to be successful, sustainable, and well located were incorporated into the analysis. From the multicriteria evaluation, the top five kitchens are all within a ten minute or less walk of a major bus stand. Kitchen group members emphasised that this was advantageous, as many travellers stop by for a snack or to buy some yoghurt to take home before boarding a bus. Igombe, despite being very far from the city centre (almost

nine kilometres) ranked highly due to its close proximity to the area's major bus terminal. Tumaini, the highest ranked kitchen, is within sight of the Mkolani bus stand.

Income per member per month may negatively influence economic sustainability in terms of pure profit, but as it aligns with the major objectives of the WHE project, it was ranked positively. Tumaini, Tukwamuane, and Igombe, the three highest ranked kitchens also have some of the highest incomes per member per month, as well as high rates of savings, although Tumaini had not yet started saving at the time of data collection, this kitchen group expressed intent to start saving once their bank account was open. Savings have a strong impact on economic sustainability, especially in terms of investing in equipment or other projects, such as education or buying land. Ownership of land and premises, for example, reduces costs in the long term. With respect to the findings, it seems that the context in which a kitchen is located, especially in terms of transport and foot traffic, is highly important as opposed to strict measures of distance.

Kitchen group members, APYN staff, and customers cited issues with kitchen premises themselves as challenging. Rental cost and characteristics of kitchen location were reported as major challenges. All kitchen groups expressed a desire to purchase land and build their own premises in order to avoid this cost. Some groups too mentioned that landlords could be neglectful in terms of repairs, especially when it came to electricity. Igombe and Mahina have experienced brownouts due to a lack of local capacity, but the Igombe members mentioned that the landlord had not repaired the building's electrics. Kitchens therefore did not use electric stovetops to heat milk, but rather by burning charcoal or gas. Gas is more expensive and only available at certain sales points, but it is more efficient, while charcoal is cheaper and readily available almost everywhere. Fuel costs varied between the kitchens due to this distinction. It must be noted, however, that kitchens with low fuel costs may also not be producing significant amounts of yoghurt, like Mahina, so fuel cost was ranked accordingly. The milk supply was an issue that several kitchens brought up, though it was not necessarily due to its cost, but due to issues with suppliers, adulteration, and the tenuousness of the supply.



The multicriteria evaluation elicited a ranking that should be relatively accurate. Some kitchens appear to be on the path to meeting the project's objectives, while others have work to do. Those low in the rankings, like Buswelu, Ebeneza, and Mahina have had issues with production in terms of the amount produced, and the quality of the product. These kitchens also tend to be geographically isolated from places people gather, like bus stands and major roads. Interestingly VSI ranked lower than expected, as it was a kitchen that APYN members thought would be able to continue if APYN ceased to exist. This may be the case for several reasons. The first is methodological: income per member per month was ranked very high in the pairwise comparison, resulting in a global weight of 0.377. For example, Tukwamuane, open since 2004, and by all accounts stable, came second in the ranking, likely due to the heavy weighting of income per member per month. In the case of VSI, its income per member per month was the lowest bar Mahina (which gave no income to its members), however this may be due to a large number of members (10), and that the majority of those members are youth under 18 who are still in school. One of the members at VSI mentioned that VSI serves as a production facility for other sales points of yoghurt around Mwanza, and that these sites had separate books. This too may account for this discrepancy. In any case, with time, those kitchens ranked near the top should be able to achieve stability.

In order to sustain the kitchens, more education is needed in terms of entrepreneurial and business skills. Furthermore, education in the broader community in order to reduce the stigma around people living with HIV/AIDS will help both the beneficiaries and the kitchen groups. Protocols around packaging and marketing should be amended or developed. It should also be determined whether kitchen groups can sell other foodstuffs on their premises in order to attract more customers.

### 5.3 Conclusions

The factors that contribute to the success of kitchens are complicated and context-specific. In order to maintain the project's goal related to the beneficiaries, confidentiality is necessary in order to achieve the second goal, a sustainable income and business for resource-poor women and youth. A location within the community, though perhaps away from the main hub may help, allowing for discretion but also visibility, as well as

allowing the kitchen groups to sell tea and ugali will also add a source of income. Kitchens should also focus on manufacturing and selling as many litres as possible in excess of the amount set aside for beneficiaries. Ensuring quality product too will draw customers (see Results). Making more money and adding more beneficiaries may draw more paying customers through word of mouth. Marketing the yoghurt to higher income groups (such as those working at NIMR and Bugando hospital) has proven successful in the past, however, the packaging issue must be sorted out before this can be began again in earnest. Packaging is a significant barrier to selling to higher income groups, as many desire to keep the yoghurt at home and eat it at their leisure (according to several kitchen workers). Other yoghurts have come on the market in convenient packaging, so this is a high priority. The stigma barrier has been mostly addressed by the kitchen workers themselves through a clever range of tactics – treating the beneficiaries as any other client, and checking their identification and having them sign later in the evening has helped, but perhaps APYN and WHE should design a new protocol to mitigate this. It can be difficult to implement new protocols because of what some APYN staff cited – the age difference and deference to elders, but by speaking respectfully and cautiously, progress has been made. Ensuring a reduction in dependency is also key, and maintaining clear roles – APYN is meant to monitor and supervise, but not dictate. Kitchens can determine their own destiny. For other development projects, the lessons that can be drawn from the APYN/WHE experience is to ensure protocols are maintained equally for each new group, as well as organising lessons in bookkeeping, entrepreneurship skills, language skills, and manufacturing regularly, rather than in an ad hoc fashion, though this should be directed by the kitchen groups themselves in order to meet their needs. Marketing the product (if there is one) is also important; further, if a project wants to appeal to higher income groups, packaging is highly important – the notion of cleanliness is key.

The APYN/WHE project has managed to cross many barriers, but if funding runs out from Canada, then many kitchens may close. In order to ensure economic sustainability, a stronger emphasis on sales, particularly to higher income groups is important. Solving the packaging problem is key, as well as marketing to those specific groups. With that, the goals of the project will be easier to meet. There are clear benefits associated with the project, despite a dearth of problems. Problems, though, do not mean

that a project is a failure. All those involved with the project do not regret joining, and many have said that their lives have improved.

## 5.4 Future Research

This study has found several factors and barriers to the success of the probiotic yoghurt kitchens in Mwanza. Future research could examine these further, particularly the HIV/AIDS stigma barrier to microenterprise, for example, how does patronage by people living with HIV/AIDS affect the perceptions and patronage of other customers? While most Mwanzans can identify misconceptions about HIV/AIDS, many still would keep a family member's status secret (TNBS 2011). The importance of this barrier was further emphasized by the kitchen group members (see Results). Most work around microenterprise and HIV/AIDS seems to be on its potential as a public health mechanism (see for example Stratford et al 2008; Ciu et al 2013; Dworkin and Blankenship 2009; Anderson et al 2002). Perhaps too the education issue can be addressed: the kitchen members need to be able to determine their own destiny, and many requested additional lessons in a number of disciplines. How this is to be structured and undertaken may need to be examined. Developing new protocols or adapting old ones to ensure APYN's flexibility will contribute to this. Supporting and maintaining current kitchens is a priority; future research could examine the packaging supply chain both in order to identify the most efficient and cost-effective methods of obtaining packaging for the kitchens as well as broader trends in the East African packaging industry. In terms of new kitchens opening, the locative process should be re-evaluated: better cartographic data might soon be available, as well as more granular data from the National Census. This would facilitate the development of a multicriteria decision analysis tool to help determine location, building on the multicriteria evaluation conducted in this study (see Results). While this study addressed issues with multicriteria evaluation approach, specifically pairwise comparison, future research could build on the integration of metamodern and feminist approaches in order to facilitate data collection in particular. Structuring interviews to better obtain preference information may be key to this, though adequate observational time should be allocated to understand the motivations of participants. More reflection is required in multicriteria evaluation, and this type of

approach will allow for increased flexibility too. In terms of development work in general, broader work could examine the feasibility of establishing probiotic yoghurt projects in other regions worldwide, be it other parts of sub-Saharan Africa, South-East Asia, or others. Examining how to communicate clearly with participants too would be productive, particularly conveying ownership; this could branch out into how to set out protocols before starting the project. In any case, this study has opened up a variety of new research questions as well as making its own contributions to the literature on development geographies and the multicriteria evaluation field.

## References

- African Probiotic Yoghurt Network. 2013. Home page. <http://www.apyn.webs.com> Date Accessed: 02/03/2015
- Allen, J. 2003. Power. In Agnew, J., Mitchell, K., and Toal, G. (Eds.) *A companion to political geography*. Blackwell: Oxford.
- Amuri, M., Mitchell, S., Cockcroft, A., and Andersson, N. 2011. Socio-economic status and HIV/AIDS stigma in Tanzania. *AIDS Care*, 23.3: 378-382.
- Anderson, C.L., Gugerty, M.K, Levine, R.O., and Weaver, M. 2002. Microfinance and HIV/AIDS: Five key questions on program impact. USAID: Washington, D.C.
- Anukam, K., and Reid, G. 2005. Providing probiotics to Sub-Saharan Africa: Ethical principles to consider. *Journal of Complementary and Integrative Medicine*, 2.1.
- Anukam, K.C., Osazuwa, E.O., Osadolor, H.B., Bruce, A.W., and Reid, G. 2008. Yogurt containing probiotic *Lactobacillus rhamnosus* GR-1 and *L. reuteri* RC-14 helps resolve moderate diarrhea and increases CD4 count in HIV/AIDS patients. *Journal of Clinical Gastroenterology*, 42.3: 239-243.
- Arcurey, T.A., and Quandt, S.A. 1999. Participant recruitment: A site-based approach to community research in complex societies. *Human Organization*, 58.2: 128-133.
- Baden, S. and Gotez, A.M. 1997. Who Needs [Sex] When You can have [Gender]? Conflicting Discourses on Gender at Beijing. In K. Staudt (Ed.) *Women, International Development, and Politics*. Temple University Press: Philadelphia.
- Barnes, T. 1996. *The logic of dislocation*. The Guilford Press: New York.
- Barnes, T. 2009. Economic geography. In Gregory, D., Johnston, R., Pratt, G., Watts, M.J., and Whatmore, S. (Eds.) *The Dictionary of Human Geography*. Blackwell: Chichester.

- Barnett, C. 1995. Awakening the dead: who needs the history of geography? *Transactions of the Institute of British Geographers*, 20.4: 417-419.
- Barrientos, S., and Kabeer, N. 2004. Enhancing female empowerment in global production: policy implications. *Global Social Policy*, 4.2: 153-169.
- Barzilai, J. 1997. Deriving weights from pairwise comparison matrices. *The Journal of the Operational Research Society*, 48.12: 1226-1232.
- Baxter, J. and Eyles, J. 1997. Evaluating Qualitative Research in Social Geography: Establishing 'Rigour' in Interview Analysis. *Transactions of the Institute of British Geographers, New Series*, 22.4: 505-525.
- Baylies, C and Bujra, J. 2000. AIDS, Sexuality and Gender in Africa: Collective Strategies and Struggles in Tanzania and Zambia. Routledge: London.
- Beall, J. 1998. Trickle-down or rising tide? Lessons on mainstreaming gender policy from Colombia and South Africa. *Social Policy and Administration*. 32:5, 513-534.
- Beck, R.M. 2003 Perceptions of gender in Swahili language and society. In Hellinger, M and Bussman, H. (Eds.) *Gender Across Languages*. John Benjamins BV: Amsterdam, 311-338.
- Bell, M., and Schuurman, N. 2010. GIS and injury prevention and control: history, challenges and opportunities. *International Journal of Environmental Research and Public Health*, 7: 1002-1017.
- Bell, M., Schuurman, N., and Hayes, M.V. 2007. Using GIS-based methods of multicriteria analysis to construct socio-economic deprivation indices. *International Journal of Health Geographics*, 6: 17.
- Beneria, L. 2003. Gender, development, and globalisation: economics as if all people mattered. Routledge: New York

- Berg, M.J. 2008. Experiential knowledge. In Given, L.M. (ed.) *The SAGE Encyclopedia of Qualitative Research Methods*. SAGE: London, 321-322.
- Binns, T., and Nel, E. 1999. Beyond the development impasse: the role of local economic development and community self-reliance in rural South Africa. *The Journal of Modern African Studies*, 37.3: 389-408.
- Bongaarts, J., and Zimmer, Z. 2002. Living arrangements of older adults in the developing world: An analysis of the Demographic and Health Survey household surveys. *Journal of Gerontology*, 57B.3: 5145-5157.
- Boschma, R., and Hartog, M. 2014. Merger and acquisition activity as a driver of spatial clustering: the spatial evolution of the Dutch banking industry 1870-1993. *Economic Geography* 90.3: 247-266.
- Bradshaw, M. and Stratford, E. 2010. Qualitative research design and rigour. In Hay, I (ed). *Qualitative research methods in human geography*. Oxford University Press: Toronto, 69-80.
- Brodsky, A.E. Researcher as Instrument. In Given, L.M. (ed.) *The SAGE Encyclopedia of Qualitative Research Methods*. SAGE: London, 766-767.
- Buckley, J.J. 1985. Fuzzy hierarchical analysis. *Fuzzy sets and systems*, 17.3: 233-247.
- Cali, M. 2014. Trade boom and wage inequality: evidence from Ugandan districts. *Journal of Economic Geography* 14.6: 1141-1174.
- Chan, M. 2010. Informality, poverty, and gender: evidence from the Global South. In Chant, S. (ed) *The international handbook of gender and poverty: concepts, research, policy*. Edward Elgar: Cheltenham, 463-471.
- Chant, S. and McIlwane, C. 2009. Geographies of development in the 21<sup>st</sup> century: An introduction to the Global South. Edward Elgar: Cheltenham.

- Ciu, R.R., Lee, R., Thirumurthy, H., Muessig, K.E., and Tucker, J.D. 2013. Microenterprise development interventions for sexual risk reduction: A systematic review. *AIDS Behavior*, 17.9, 2864-2877.
- Cornwall, A. 2000. Missing men? Reflections on men, masculinities, and gender in GAD. *IDS Bulletin*. 31:2, 18-27.
- Cornwall, A. 2003. Whose voices? Whose choices? Reflections on gender and participatory development. *World Development*. 31:8, 1325-1342.
- Cornwall, A., and Brock, K. 2005. What do buzzwords do for development policy? A critical look at 'participation,' 'empowerment,' and 'poverty reduction.' *Third World Quarterly*, 26.7: 1043-1060.
- Creighton, C. and Omari, C.K. 1995. *Gender, Family and Household in Tanzania*. Avebury: Aldershot.
- Creighton, C. and Omari, C.K. 2000. *Gender, Family and Work in Tanzania*. Ashgate: Burlington.
- Cummins, S., Stafford, M., MacIntyre, S., Marmot, M., and Ellaway, A. 2005. Neighbourhood environment and its association with self-rated health: Evidence from Scotland and England. *Journal of Epidemiology and Community Health* 59: 207-213.
- Da Cruz, A.G., Faria, J.A.F., and van Dender, A.G.F. 2001. Packaging systems and probiotic dairy foods. *Food Research International*, 40.8: 951-956.
- Delgado, M.G., and Sendra, J.B. 2004. Sensitivity analysis in multicriteria spatial decision-making: a review. *Human and Ecological Risk Assessment: An International Journal*, 10.6: 1173-1187.
- Devereux, P. 2008. International volunteering for development and sustainability: Outdated paternalism or a radical response to globalisation? *Development in Practice*, 18.3: 357-370.



- Dols, J.A.M., Boon, M.E., Monachese, M., Changalucha, J., Butamanya, N., Varriano, S., Vihant, O., Hullegie, Y., van Tienen, A., Hummelen, R., and Reid, G. 2011. The impact of probiotic yogurt on HIV positive women in Tanzania. *International Dairy Journal*, 21.8: 575-577.
- Dowling, R. 2010. Power, subjectivity and ethics in qualitative research. In Hay, I (ed). *Qualitative research methods in human geography*. Oxford University Press: Toronto, 26-39.
- Drezner, T. 2006. Derived attractiveness of shopping malls. *IMA Journal of Management Mathematics*, 17: 349-358.
- Drobne, S., and Lisec, A. 2009. Multi-attribute decision evaluation in GIS: weighted linear combination and ordered weighted averaging. *Informatica*, 33: 459-474.
- Dworkin, S.L., and Blankenship, K. 2009. Microfinance and HIV/AIDS prevention: Assessing its promise and limitations. *AIDS Behavior*, 13.3: 462-469.
- Dwyer, R.E. 2013. The care economy? Gender, economic restructuring and job polarization in the United States labour market. *American Sociological Review* 78.3: 390-416.
- Eastman, J.R. 2009. IDRISI Taiga: guide to GIS and image processing. Worcester: Clark Labs.
- England, K.V.L. 1993. Getting personal: reflexivity, positionality, and feminist research. *Professional Geographer* 46.1: 80-89.
- Eskandri, M., Homae, M, Mahmodi, S. 2012. An integrated multi criteria approach for landfill siting in a conflicting environmental, economical and socio-cultural area. *Waste Management* 32: 1528-1538.
- Ezzy, D. 2010. Qualitative interviewing as an embodied emotional performance. *Qualitative Inquiry*, 16.3: 163-170.

- Flynn, K. 2005. *Food, Culture, and Survival in an African City*. Palgrave Macmillan: New York.
- Friedberg, S. 2001. To garden, to market: gendered meanings of work on an African urban periphery. *Gender Place and Culture*, 8:1, 5-24.
- Gemitzi, A., Tsihrintzis, V.A., Voudrias, E., Petalas, C., and Stravodimos, G. 2007. Combining geographic information system, multicriteria evaluation techniques, and fuzzy logic in siting MSW landfills. *Environmental Geology*, 51: 797-811.
- Genberg, B.L., Hlavka, Z., Kanda, K.A., Maman, S., Chariyalertsak, S., Chinguno, A., Mbwambo, J., Modiba, P., Van Rooyen, H., and Celentano, D.D. 2009. A comparison of HIV/AIDS related stigma in four countries: Negative attributes and perceived acts of discrimination towards people living with HIV/AIDS. *Social Science and Medicine*, 68.12: 2279-2287.
- Gill, H.S. and Guarner, F. 2004. Probiotics and human health: a clinical perspective. *Postgraduate Medical Journal*, 80: 516-526.
- Gould, P. and White, R. 1986. *Mental maps*. Allen and Unwin: Boston.
- Greene, R., Devillers, R., Luther, J.E., and Eddy, B.G. 2011. GIS-based multiple-criteria decision analysis. *Geography Compass*, 5/6: 412-432
- Halai, A. 2006. *Ethics in Qualitative Research: Issues and Challenges*. EdQual: A Research Program Consortium on Implementing Education Quality in Low Income Countries. *Working paper No. 4*. Pakistan: The Aga Khan University.
- Harker, P.T. 1987a. Incomplete pairwise comparisons in the analytic hierarchy process. *Mathematical Modelling*, 9.11: 837-848.
- Harker, P.T. 1987b. Shortening the comparison process in the AHP. *Mathematical Modelling*, 8: 1390-1441.

- Ho, S. 2005. Evolution versus tradition in marketing system: the Hong Kong food retailing experience. *Journal of Public Policy and Marketing*, 24.1: 90-99.
- Howitt, R., and Stevens, S. 2010. Cross-cultural research ethics, methods, and relationships. In Hay, I (ed). *Qualitative research methods in human geography*. Oxford University Press: Toronto, 40-68.
- Hummelen, R., Changalucha, J., Butamanya, N.L., Koyama, T.E., Cook, A., Habbema, J.D.F., and Reid, G. 2011. Effect of 25 weeks probiotic supplementation on immune function of HIV patients. *Gut Microbes*, 2.2: 80-85.
- Irvine, S.L., Hummelen, R., and Hekmat, S. 2011. Probiotic yogurt consumption may improve gastrointestinal symptoms, productivity, and nutritional intake of people living with human immunodeficiency virus in Mwanza, Tanzania. *Nutrition Research*, 31.12: 875-881.
- Irvine, S.L., Hummelen, R., Hekmat, S., Looman, C.W.N., Habbema, J.D.F., and Reid, G. 2010. Probiotic yogurt consumption is associated with an increase of CD4 count among people living with HIV/AIDS. *Journal of Clinical Gastroenterology* 44.9: 201-205.
- Ishizaka, A. 2012. A multicriteria approach with AHP and clusters for the selection among a large number of suppliers. *Pesquisa Operacional*, 32(1): 1-15.
- Ishizaka, A., and Nemery, P. 2013. Multi-criteria decision analysis: methods and software. Wiley: Chichester.
- Jankowski, P. 1995. Integrating geographical information systems and multiple criteria decision-making methods. *International Journal of Geographical Information Systems*, 9.3: 251-273.
- Jiang, H., and Eastman, J.R. 2000. Application of fuzzy measures in multi-criteria evaluation in GIS. *International Journal of Geographical Information Science*, 14.2: 173-184.

- Kabeer, N. 2003. Gender mainstreaming in poverty eradication and the Millennium Development Goals: a handbook for policymakers and other stakeholders. Commonwealth Secretariat: London.
- Kabeer, N. 2010. Gender and social protection strategies in the informal economy. Routledge: New Delhi.
- Karnatak, H.C., Saran, S., Bhatia, K., Roy, P.S. 2007. Multicriteria spatial decision evaluation in web GIS environment. *Geoinformatica*, 11: 407-429.
- Kelly, P. 2008. Logics of Dislocation (1996): Trevor J. Barnes. In P. Hubbard, R. Kitchin, and G. Valentine (Eds.). *Key Texts in Human Geography*. Sage: Los Angeles.
- Kevane, M. 2004. Women and Development in Africa: How Gender Works. Lynne Rienner Publishers: London.
- King, L.J. 2002. Alternatives to a positive economic geography. In M.J. Dear and S. Flusty (Eds.) *The spaces of postmodernity: readings in human geography*. Oxford: Blackwell.
- Kirby, A. (2006). The death of postmodernism and beyond. *Philosophy Now*, 58.
- Kirk, P. and A.M. Shutte. 2004. Community leadership development. *Community Development Journal*, 39.3: 234-251.
- Kothari, U. and Minogue, M. 2002. Development theory and practice: critical perspectives. Palgrave Macmillan: London.
- Krugman, P. 1998. What's new about new economic geography? *Oxford Review of Economic Policy*, 14.2: 7-17.
- Langevang, T., and Gough, K.V. 2012. Diverging pathways: young female employment and entrepreneurship in sub-Saharan Africa. *The Geographical Journal*. 178:3, 242- 252.

- Lawuo, AZ, Mbaswa WLB, Mnyawi SP 2013. Potentials of mobile banking on the provision of financial services in rural areas: Experiences from Tanzania. *International Journals of Marketing and Technology*, 3.9: 1-11.
- Lee, R. 2010. Economic society/social geography. In Smith, S.J., Pain, R., Marston, S.A., and Jones, J.P. (eds.) *The SAGE Handbook of Social Geographies*. London: Sage.
- Liamputtong, P. 2007. Researching the vulnerable: A guide to sensitive research methods. Sage: Aldershot.
- Lie, H., Rich, K.M, Kurwijila, L.R., and Jervell, A.M. 2012. Improving smallholder livelihoods through local value chain development: a case study of goat milk yoghurt in Tanzania. *International Food and Agribusiness Management Review*. 15.3: 55-86.
- Livingstone, D.N. 1992. *The Geographical Tradition*. Blackwell: Oxford.
- Malczewski, J. 1999. GIS and multicriteria decision analysis. New York: John Wiley and Sons.
- Malczewski, J. 2004. GIS-based land use suitability analysis: a critical overview. *Progress in Planning*, 62: 3-65.
- Malczewski, J. 2006a. GIS-based multicriteria decision analysis: a survey of the literature. *International Journal of Geographical Information Science* 20.7: 703-726.
- Malczewski, J. 2006b. Ordered weighted averaging with fuzzy quantifiers: GIS-based multicriteria evaluation for land-use suitability analysis. *International Journal of Applied Earth Observation and Geoinformation*, 8: 270-277.
- Malczewski, J. 2010. Multiple criteria decision analysis and GIS. In M. Ehrgott, J. R. Figueira, and S. Greco (eds.) *Trends in multiple Criteria Decision Analysis* New York: Springer, 369-395.

- Martin, R. 2012. Regional economic resilience, hysteresis, and reactionary shocks. *Journal of Economic Geography* 12.1: 1-32.
- McDowell, L. 2009. Working bodies: Interactive service employment and workplace identities. Blackwell: Chichester.
- Mdoe, N., and Wiggins, S. 1996. Dairy products demand and marketing in the Kilimanjaro Region, Tanzania. *Food Policy*, 21.3: 319-336.
- Meagher, K. 2010. The empowerment trap: gender, poverty, and the informal economy in Sub-Saharan Africa. In Chant, S. (ed) *The International Handbook of Gender and Poverty: Concepts, Research, Policy*. Edward Elgar: Cheltenham, 472-477.
- Meng, Y., Malczewski, J., Boroushaki, S. 2011. A GIS-based multicriteria decision evaluation approach for mapping accessibility patterns of housing development sites: a case study in Canmore, Alberta. *Journal of Geographic Information Systems*, 3.1: 50-61.
- Miller, W.L. and Crabtree, B .F. 2004. Depth Interviewing. In Hesse-Biber, S. and Leavy, P. (eds) *Approaches to Qualitative Research: A Reader on Theory and Practice*. Oxford: New York.
- Mohanty, C.T., Russo, A., and Torres, L. 1991. Third world women and the politics of feminism. Indiana University Press: Bloomington.
- Momsen, Janet H. 2004. Gender and development. Psychology Press: Abingdon.
- Moser, C. 1993. Gender planning and development: Theory, practice, and training. London: Verso.
- Moser, C., and Moser, A. 2005. Gender mainstreaming since Beijing: A review of success and limitations in international institutions. *Gender and Development*, 13.2: 11-22.

- Moss, T., Pettersson, G., and van de Walle, N. 2006. An aid-institutions paradox? A review essay on aid dependency and state building in sub-Saharan Africa. *Centre for Global Development Working Paper no 74*.
- Murphy, J.T. 2003. Social, spatial, and industrial development in East Africa: deconstructing the logistics of industry networks in Mwanza, Tanzania. *Journal of Economic Geography* 3.2: 173-198.
- Nagar, R., Lawson, V., McDowell, L., and Hanson, S. 2002. Locating globalisation: Feminist (re)readings of the subjects and spaces of globalisation. *Economic Geography* 78.3 257-284.
- Namulemia, E., Sparling, J., Foster, H.D. 2007. Nutritional supplements can delay the progression of AIDS in HIV-infected patients: Results from a double-blinded, clinical trial at Mengo Hospital, Kampala, Uganda. *Journal of Orthomolecular Medicine*, 22: 129-136.
- Njarui, D.M.G., Gatheru, M., Wambua, J.M., Nguluu, S.N., Mwangi, D.M., and Keya, G.A. 2011. Consumption patterns and preference of milk and milk products among rural and urban consumers in semi-arid Kenya. *Ecology of Food and Nutrition*, 50.3: 240-262.
- Oakley, A. 2003. Interviewing women: A contradiction in terms. In Lincoln, Y.S. and Denzin, N.K. (eds) *Turning points in qualitative research: Tying knots in a handkerchief*. Altamira Press: Toronto.
- Olvera, L., Pat, D., and Pochet, P. 2008. Household transportation experiences in Sub-Saharan African cities: measurement and analysis. *Journal of Transport Geography* 16.1: 1-13.
- Omore, A., Staal, S.J., Osafo, E.L.K, Kurwijilla, L., Barton, D., Mdoe, N., Nurah, G., and Aning, G. 2004. Market mechanisms, efficiency, processing, and public health risks in peri-urban dairy product markets: synthesis of findings from Ghana and Tanzania. United Kingdom Department of International Development: London.

- Oppong, C. 2006. Familial roles and social transformations: Older men and women in Sub-Saharan Africa. *Research on Aging*, 28.6: 654-668.
- Overman, H.G. 2004. Can we learn anything from economic geography proper? *Journal of Economic Geography* 4.5: 501-516.
- Palacios, C.M. 2010. Volunteer tourism, development and education in a postcolonial world: conceiving global connections beyond aid. *Journal of Sustainable Tourism* 18.7: 861-878.
- Pearson, A.L. and Paige, S.B. 2012. Experiences and ethics of mindful reciprocity while conducting research in sub-Saharan Africa. *African Geographical Review*. 31.1: 72-75.
- Peck, J. 2005. Economic sociologies in space. *Economic Geography*, 81: 129-175.
- Plummer, P., and Sheppard, E.S. 2006. Geography matters: Agency, structures, and dynamics at the intersection of economics and geography. *Journal of Economic Geography*, 8.6: 619-637.
- Rao, A. 2006. Making institutions work for women. *Development*, 49.1: 63-67.
- Raymond, E.M. and Hall, C.M. 2008. The development of cross-cultural (mis)understanding through volunteer tourism. *Journal of Sustainable Tourism* 16.5: 530-543.
- Razavi, S. and Staab, S. 2010. Gender, poverty, and inequality: the role of markets, states and households. In Chant, S. (ed) *The international handbook of gender and poverty: concepts, research, policy*. Edward Elgar: Cheltenham, 427-433.
- Reid, G. 2010. The potential role for probiotic yogurt for people living with HIV/AIDS. *Gut Microbes*, 1.6: 411-414.
- Relph, E. 1976. Place and placelessness. Pion Limited: London.



- Rose, G. (2002). Feminism and geography: the limits of geographical knowledge. . In M.J. Dear and S. Flusty (Eds.) *The spaces of postmodernity: readings in human geography*. Oxford: Blackwell.
- Roura, M., Urassa, M., Busza, J., Mbata, D., Wringe, A., and Zaba, B. 2008. Scaling up stigma? The effects of antiretroviral rollout on stigma and HIV testing: Early evidence from rural Tanzania. *Sexually Transmitted Infections*, 85.4: 308-312.
- Saaty, T.L. 1980. The analytic hierarchy process: planning, priority setting, resource allocation. Toronto: McGraw-Hill.
- Sebele, L.S. 2010. Community-based tourism ventures, benefits, and challenges: Khama Rhino Society Trust, Central District, Botswana. *Tourism Management*, 31: 136-146.
- Simpson, K. 2004. 'Doing development': the gap year, volunteer-tourists and a popular practice of development. *Journal of International Development*, 16.5: 681-692.
- Sin, H.L. 2010. Who are we responsible to? Locals' tales of volunteer tourism. *Geoforum* 41: 983-992.
- Smyth, I. 2007. Talking of gender: Words and meaning in development organisations. *Development in Practice*, 17.4-5: 582-588.
- Söderbom, M., Teal, F. J., Wambugu, A., Kahyarara, G. 2006 The dynamics of returns to education in Kenyan and Tanzanian manufacturing. *Oxford Bulletin of Economics and Statistics* 68: 261–288
- Stratford, D., Mizuno, Y, Williams, K, Courtenay-Quirk, C., and O'Leary, A. 2008. Addressing poverty as risk for disease: Recommendations from CDC's consultation on microenterprise as HIV prevention. *Public Health Reports*, 123.1: 9-20.
- Sumathi, V.R., Natesan, U., and Sarkar, C. 2008. GIS-based approach for optimized siting of municipal solid waste landfill. *Waste Management*, 28: 2146-2160.

- Symeonakis, E., Robinson, T., and Drake, N. 2007. GIS and multiple-criteria evaluation for the optimisation of tsetse fly eradication programmes. *Environmental Monitoring and Assessment*, 124: 89-103.
- Talwalkar, A., Miller, C.W., Kailasapathy, K., and Nguyen, M.H. 2004. Effects of packaging materials and dissolved oxygen on the survival of probiotic bacteria in yoghurt. *International Journal of Food Science and Technology*, 39.6: 605-611.
- Tanzanian National Bureau of Statistics (TNBS). 2011. Demographic and health survey 2010. The United Republic of Tanzania: Dar es Salaam.
- Tanzanian National Bureau of Statistics. 2013a. 2012 Population and housing census: population distribution by administrative areas. The United Republic of Tanzania: Dar es Salaam.
- Tanzanian National Bureau of Statistics. 2013b. 2013 National HIV/AIDS Survey. The United Republic of Tanzania: Dar es Salaam.
- Tanzanian National Bureau of Statistics. 2014. Population and housing census. The United Republic of Tanzania: Dar es Salaam.
- Thrift, N., and Olds, K. 1996. Refiguring the economic in economic geography. *Progress in Human Geography* 20.1: 311-327.
- Tomkins, A.M. 2005. Evidence-based nutrition interventions for the control of HIV/AIDS. *South African Journal of Clinical Nutrition*, 18: 187-191.
- UNODC. 2013. Gender mainstreaming in alternative development.  
<http://www.unodc.org/unodc/en/alternative-development/gender-mainstreaming-in-alternative-development.html> . Retrieved October 10, 2013.
- Vaidya, O.S., and Kumar, S. 2006. Analytic hierarchy process: an overview of applications. *European Journal of Operational Research*, 169: 1-29.

- Vahidnia, M.H., Alesheikh, A.A., Alimohammadi, A. 2009. Hospital site selection using fuzzy AHP and its derivatives. *Journal of Environmental Management*, 90.10: 3048-3056.
- Vermeulen, T., & van den Akker, R. (2010). Notes on metamodernism. *Journal of Aesthetics and Culture*, 2: 1-14.
- Walby, S. 2005. Gender mainstreaming: productive tensions in theory and practice. *Social Politics*, 12.3: 321-343.
- Wenner, M. 2009. A cultured response to HIV. *Nature Medicine* 15.6: 594-597.
- Whaling, M.A., Luginaah, I., Reid, G., Hekmat, S., Thind, A., Mwanga, J., and Changalucha, J. 2012. Perceptions about probiotic yogurt for health and nutrition in the context of HIV/AIDS in Mwanza, Tanzania. *Journal of Health, Population, and Nutrition*, 30.1: 31-40.
- Wight, R.G., Aneshessel, C.S., Barrett, C., Ko, M., Chodosh, J., and Karlamangla, A.S. 2013. Urban neighbourhood unemployment histories and depressive symptoms over time among late middle aged and older adults. *Journal of Epidemiology and Community Health* 67: 153-158.
- Winchester, H.P.M. and Roge, M.W. 2010. Qualitative research and its place in human geography. In Hay, I (ed). *Qualitative research methods in human geography*. Oxford University Press: Toronto, 3-25.
- Wodon, Q., and Blackden, C.M. 2006. Gender, time use, and poverty in Sub-Saharan Africa. *World Bank Working Papers* 73.
- World Bank. 2007 Probiotic Yogurt for Health and Nutrition in East Africa: Women helping women. World Bank: Washington, D.C
- World Bank. 2011. World development report 2012: Gender equality and development. The World Bank: Washington, D.C.

World Bank, Tanzania Food and Nutrition Centre (TFNC), and UNICEF. 2007. United Republic of Tanzania advancing nutrition for long-term equitable growth. World Bank: Washington, D.C.

World Health Organisation (WHO) and Food and Agriculture Organisation of the United Nations (FAO). 2002. Guidelines for the Evaluation of Probiotics in Food. United Nations: London, Ontario.

WHO. 2009. Strategy for integrating gender analysis and action into the work of WHO. WHO: Geneva.

Zavadskas, E.K., Kaklauskas, A. and Vilutiene, T. 2009. Multicriteria evaluation of apartment blocks maintenance contractors: Lithuanian case study. *International Journal of Strategic Property Management*. 12, 319-338.

# Appendices

## Appendix 1: Ethical Approval



Research Ethics

Use of Human Participants - Ethics Approval Notice

Principal Investigator: Dr. Isaac Luginaah  
 File Number: 103513  
 Review Level: Full Board  
 Approved Local Adult Participants: 0  
 Approved Local Minor Participants: 0  
 Protocol Title: An Economic and Locational Analysis of Probiotic Yogurt Kitchens in Mwanza, Tanzania  
 Department & Institution: Social Science/Geography, Western University  
 Sponsor:  
 Ethics Approval Date: April 18, 2013 Expiry Date: December 31, 2015

**Documents Reviewed & Approved & Documents Received for Information:**

Document Name	Comments	Version Date
Instruments	Interview Checklists and Mental Map Exercise Description	2013/02/05
Other	RA Confidentiality Agreement	2013/02/05
Western University Protocol		2013/02/05
Board Recommendations	Responses to Board Recommendations	2013/04/01
Letter of Information & Consent	Revised letter of Information - Customers	2013/04/17
Letter of Information & Consent	Revised letter of information - Mama/Key Informants	2013/04/17

This is to notify you that The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the applicable laws and regulations of Ontario has granted approval to the above named research study on the approval date noted above.

This approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the NMREB's periodic requests for surveillance and monitoring information.

Members of the NMREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussions related to, nor vote on, such studies when they are presented to the NMREB.

The Chair of the NMREB is Dr. Riley Hinson. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

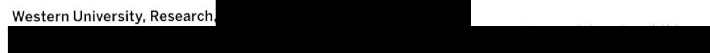


Ethics Officer to Contact for Further Information

Grace Kelly	Shantel Walcott
-------------	-----------------

*This is an official document. Please retain the original in your files.*

Western University, Research



**Appendix 2: Informed Consent and Letter of Information**  
Invitation to Participate in Interview and Mental Map Exercise

I am Emily Catherine Eyles, an MA candidate under the supervision of Dr. Isaac Luginaah in the Department of Geography at the University of Western Ontario in Canada. I am currently conducting research for my thesis on the locational and economic aspects of probiotic yogurt kitchens in Mwanza, Tanzania. The purpose of the study is to examine the factors in determining success for probiotic yogurt kitchens in Mwanza. The objective is to understand these factors and apply them to a model to determine optimal location, as well as to better understand personal everyday geographies and how they relate to these factors. I would like to invite you to participate in this study, by being interviewed by a research assistant with myself present, and also participating in a mental mapping exercise.

If you agree to participate, you will be asked to participate in an interview and draw a mental map of your area. It is anticipated that the entire task will take approximately two hours, over one or two sessions. There will be a total of approximately 60 participants. The interview questions will cover information on issues such as your thoughts on the location of the yogurt kitchens, preferences on this topic, and your ideas about the sustainability of the yogurt kitchen. The mental map exercise will cover information on your neighbourhood, the yogurt kitchen, and your home. Both activities will be digitally recorded. The recordings will be then transferred to an external, password protected drive. All information from respondents will be de-identified before storage, and the information will only be used for the purposes of the study. All personal information will be kept confidential. Paper copies (of maps, etc.) will be kept in a secure cabinet, and digital information on a password protected computer. The information will be destroyed five years after publication.

There are no known risks with your participation in this discussion, apart from potential discomforts related to talking about personal thoughts or feelings. The research assistant has signed a confidentiality agreement, strictly binding them to secrecy in all matters related to the study.

Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time with no effect on your future work or status. There is no penalty for withdrawing or refusing to answer any of the questions. Answering these questions means that you are 18 years or older and have agreed to participate in this study. There are no financial benefits for participating in this study, though findings from the study will be distributed to local organisations in order to improve current and future yogurt kitchens.

While we will do our best to protect your information there is no guarantee that we will be able to do so. Representatives of The University of Western Ontario Research Ethics Board may contact you or require access to your study-related records to monitor the conduct of the research. If you have any questions about your rights as a research participant or the conduct of this study, you may contact The Office of Research Ethics Sincerely,

Dr Isaac Luginaah

Emily Catherine Eyles

I have read the Letter of Information, have had the nature of study explained to me, and all questions have been answered to my satisfaction and I agree to participate

Participant Name \_\_\_\_\_ Participant

Signature\_\_\_\_\_

Date\_\_\_\_\_

Investigator's Name \_\_\_\_\_ Investigator's

Signature\_\_\_\_\_

Date\_\_\_\_\_



### **Appendix 3: Research Assistant Confidentiality Agreement**

#### Research Assistant Confidentiality Agreement

This letter is to indicate an agreement between Dr Isaac Luginaah and Emily Eyles of the University of Western Ontario and [name], Research Assistant to ensure the confidentiality of information collected by the research assistant in interviews to collect information concerning the locational aspects, mental maps and challenges of the probiotic yogurt kitchens in Mwanza, Tanzania.

All information collected by the research is confidential. No one aside from the research assistant, Dr. Luginaah, or research team will have access to the information. While in possession of this information, the research assistant will keep the information in a locked file or on a password protected computer accessible only to them. The research assistant understands that the information is considered the property of Dr Luginaah, and will not disseminate any information for any reason.

Owner's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Research Assistant Name \_\_\_\_\_

Research Assistant Signature \_\_\_\_\_

Date: \_\_\_\_\_

## **Appendix 4: Interview Guides**

### **A) Yogurt Mamas Interview Checklist and Mental Map Directions**

#### **Probiotic Yogurt Kitchen Employment**

- How long have you been working as a Yogurt Mama?
- What motivated you to start working in the kitchen?
- Describe the role you play in the running of this yogurt kitchen.
- How often do you work in the yogurt kitchen? Every day? Only some days? Which? Hours of work?
- Describe your thoughts on working in the kitchen.
  - (Probe: Challenges? Interests? Social network? Social capital/friends etc.)
- Do you face any problems in getting to work?
  - (Probe: Travelling? Walking? Cycling? Specific impediments? Others?)
- Would you say that the yogurt kitchen provides a valuable service?
  - (Probe: A valuable service for who? Why? Why not?)
- Would you make any changes to the way the kitchen is run?
- Describe your experiences as a Yogurt Mama? Probes: empowering, independence, extra income, sense of community, self-worth etc. ?

#### **Location/Economic Success**

- Could you describe to me how your group came to settle on this location for your kitchen?
- What issues did the group discuss before your choice?
  - (Probe: Economic factors? Access? Rent? Free Space, Aesthetics? Potential customer base? )
- What do you think are the factors that can help the kitchen succeed?
  - (Probe: As a business in general in Mwanza? For a probiotic yogurt kitchen?)
  - In your view what do you think is the most important factor that will indicate that this yogurt kitchen has been successful?
- Do you see your kitchen location as playing a role in its success?
  - Why do you say so?
- What are your thoughts on the current kitchen location? Would you make any changes?
- How would you determine that your kitchen is operating sustainably?
  - (Probe: Not running out of money for milk etc., savings for future expansion, group dynamics, understandings etc.)

#### **Mental Map Exercise**

- Please use the materials provided to draw a map of where the kitchen is in relation to your home and other landmarks, in particular, but not limited to, the other yogurt

kitchens. If you feel that you know of a better location of the kitchen, please mark it on the map, and explain why you feel it is a better location.

**General Information**

- How old are you?
- How long did you go to school for?
- Would you say that your income supplies your needs?
- (Probe: Sources of income? Yogurt Kitchen as sole source? Difficulties?)

**Conclusion:** Is there anything else you'd like to say or add to what we discussed today?

## **B) Kivulini Women's Organisation Interview Checklist and Mental Map Directions**

### **Probiotic Yogurt Kitchens**

- What role, if any, do you play in the planning of the yogurt kitchens in Mwanza?
- Do you consider the kitchens to be a network of similar establishments?
- What would you say are the challenges of these groups?
- Are the challenges unique to each group?
- What do you think about the program? Does it empower women? Are the women participating more successful than if they had not have?

### **Location/Economic Success**

- How invested was Kivulini in the choosing of locations for the kitchens?
- Describe your understanding of how the groups came by choosing the locations for the kitchens? Do they come to Kivulini for advice?
- What do you think are the factors that can help the kitchen succeed?
  - (Probe: As a business in general in Mwanza? For a probiotic yogurt kitchen?)
  - In your view what do you think is the most important factor that will indicate that this yogurt kitchen has been successful?
- What are your thoughts on the kitchen locations as playing a role in their success?
  - Why do you say so?
- How would you determine that the kitchens in Mwanza are operating sustainably?
  - (Probe: Not running out of money for milk etc., savings for future expansion, group dynamics, understandings etc.)
- How would you plan differently for future kitchens, if at all?
- Describe your views about increasing the number of kitchens in Mwanza. Are there any opportunities? What are the challenges?

### **Mental Map Exercise**

- Please use the materials provided to draw a map of where the kitchens are and where future kitchens may be planned. Please indicate some landmarks on the map, and if you believe some kitchens should be located elsewhere, please indicate this on the map, and explain verbally why it should be in a different location.

### **General Information**

- How old are you?
- How long did you go to school for?
- Would you say that your income supplies your needs?
- (Probe: Sources of income? Difficulties?)
- What role do you play within Kivulini?

**Conclusion:** Is there anything else you'd like to say or add to what we discussed today?

## **C) Customer Interview Checklist and Mental Map Directions**

### **Probiotic Yogurt Kitchens**

- How often do you come to the yogurt kitchen?
- Do you go to more than one kitchen?
  - (Probe: Which other kitchens do you go to? Why?)
- What do you value about the yogurt kitchen?
- Do you think that others would agree with you about the value of the yogurt kitchen?
- Describe to me your overall impressions of the yogurt kitchen?
- Describe your perceptions about the probiotic yogurt.
- Is the kitchen conveniently located?
  - (Probe: How can this be improved? Do you think some people don't come to the kitchen because it's inconvenient?)
- Do you know any of the Yogurt Mamas?

### **Travel**

- How long does it take you to travel to this yogurt kitchen?
  - (Probe: How did you get to this kitchen? Walk, bicycle, Dala Dala?)
- Explain any obstacles or impediments to your journey?
  - (Probe: Major versus minor obstacles?)
- What do you think would make access to the kitchen easier easier?
  - (Probe: Change of kitchen location?)

### **Mental Map Exercise**

- Please use the materials provided to draw a map of where the kitchen is in relation to your home and other landmarks, taking care to also mark the route by which you came to the kitchen. If you feel that you know of a better location of the kitchen, please mark it on the map, and explain why you feel it is a better location.

### **General Information**

- How old are you?
- How long did you go to school for?
- Would you say that your income supplies your needs? Are you employed? What do you do? (Probe: Sources of income? Difficulties?)

**Conclusion:** Is there anything else you'd like to say or add to what we discussed today?



## Curriculum Vitae

**Name:** Emily Catherine Eyles

**Post-secondary Education and Degrees:** University of Toronto  
Toronto, Ontario, Canada  
2007-2011 B.A. Hon.

The University of Western Ontario  
London, Ontario, Canada  
2012-2015 M.A.

**Honours and Awards:** Province of Ontario Graduate Scholarship  
2012-2014

**Related Work Experience:** Teaching Assistant  
The University of Western Ontario  
2012-2014

Research Coordinator  
St Michael's Hospital  
2012

### Publications:

Eyles, J., Fried, J. and Eyles, E. (2014). Redacted in Nebraska: The noises of conspiracy around nuclear power problems. *GeoJournal*, DOI: 10.1007/s10708-013-9496-8

Eyles, J., Edge, S., and Eyles, E. (2012). Metaphor and environmental health discourse in Canada's Chemical Management Plan: Hegemonic closures around chemical exposure. *Social Space/Przestrzeń Społeczna*, 4: 1-30.

Eyles, J. and Eyles, E. 2010. A portrait of population and health characteristics in Ontario. Health Canada.

Newbold, B., Toth, A. and Eyles, E. 2009. Radon. Great Lakes Public Health Network Report.

Newbold, B., Toth, A. and Eyles, E. 2008. Antibiotics Resistance in Farm Animals. Great Lakes Public Health Network Report.

Newbold, B., Toth, A. and Eyles, E. 2008. Bisphenol A. Great Lakes Public Health Network Report.

Newbold, B., Toth, A. and Eyles, E. 2008. Birth Defects. Great Lakes Public Health Network Report.

Newbold, B., Toth, A. and Eyles, E. 2008. Lead. Great Lakes Public Health Network Report.