

**UNIVERSITY OF THE WITWATERSRAND,
SCHOOL OF GEOGRAPHY, ARCHAEOLOGY
AND ENVIRONMENTAL STUDIES, FACULTY OF
SCIENCE**

**THE PERCEPTION OF CLEAN COOKSTOVE
TECHNOLOGIES IN RURAL SWAZILAND**

MASTER OF SCIENCE BY DISSERTATION

LINDIWE CHOLA DLAMINI

605890

**A dissertation submitted to the Faculty of Science, University of the
Witwatersrand, in fulfilment of the requirements for the degree of
Master of Science**

DECLARATION

I declare that this dissertation is my own, unaided work. It is being submitted for the degree of Master of Science in the University of the Witwatersrand, Johannesburg. It has not been submitted for any degree or examination in any other University.

A handwritten signature in black ink, consisting of several overlapping loops and a horizontal line extending to the right.

On this 21st day of March 2015

ABSTRACT

Over 60% of the Swazi population resides in rural areas and rely on woodfuel for their daily cooking needs. Cooking with woodfuel on open fires is inefficient and unhealthy, leading to millions of deaths of women and children each year while also contributing to environmental degradation. This has necessitated the implementation of Government's clean cookstoves programme in Swaziland. This study focused on household stove users in six chiefdoms in the Lower Usuthu Sustainable Land Management (LUSLM) Project area in Siphofaneni Swaziland. A survey conducted through the dissemination of a questionnaire was used to investigate how rural perceptions impact on the adoption of clean cookstove technologies as an alternative household energy technology contributing towards sustainable development in rural Swaziland.

Results from this study indicate that although cooking on an open fire was the least desired cooking technology, only 2% of households in the project area own clean cookstoves and less than half of the households had knowledge of cookstoves. The study further revealed that over 80% of the households in the survey area would prefer using a clean cookstoves to reduce the labour intensive task of collecting firewood as well as reducing exposure to smoke. The households found to have some knowledge of the benefits of clean cookstoves indicated the willingness to pay for a clean cookstove; however, a third of the respondents indicated a preference of obtaining a free clean cookstove. The price and availability of the clean cookstove in rural areas were two main barriers to increased uptake of the stoves, coupled with the need to purchase new pots. Despite the general lack of awareness of these technologies, challenges such as danger of the stoves to children and stove durability were also cited. The results indicate the need for the ongoing clean cookstove programme being implemented by the Government of Swaziland to improve on its strategy, to focus on incorporation of perceptions of rural stove users in development of appropriate cookstove designs, distribution models, and the design and implementation of a cookstove quality control programme.

Keywords: clean cookstoves, woodfuel, sustainable energy

ACKNOWLEDGEMENTS

To the Lower Usuthu Sustainable Land Management (LUSLM) Team led by Ms Lynn Kota, thank you for the opportunity, the support and believing in me.

To my supervisors, Ms Raesa Moolla and Prof Stefan Grab, thank you for the encouraging and being patient with me.

DEDICATION

To my family, I cannot thank you enough for the unconditional love and being a pillar of support through it all. May God bless you!

TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
DEDICATION	v
LIST OF TABLES AND FIGURES	ix
ACRONYMS	xi
GLOSSARY	xiii
1 CHAPTER ONE: INTRODUCTION	1
1.1 Research Questions	4
1.2 Aims and Objectives of The Study	4
1.3 Methodological Considerations	5
1.4 Dissertation Outline	6
2 CHAPTER TWO: COUNTRY PROFILE	7
2.1 Swaziland's Agro-Ecological Zones	8
2.2 Socio-Economic Outlook on Swaziland	12
2.3 Study Area	13
3 CHAPTER THREE: RESEARCH METHODOLOGY	16
3.1 Research Approach	16
3.2 Research Design	17
3.3 Sample Selection	19
3.4 Primary Data Collection Method	20
3.5 Secondary Data Collection Methods	22
3.5.1 Government Publications	23
3.5.2 Online Publications	23
3.6 Data Analysis	23
3.7 Ethical considerations for the questionnaire and interviews	24

4	CHAPTER FOUR: LITERATURE REVIEW	25
4.1	Global Energy Access	25
4.2	The Role of Sustainable Energy in the Development Agenda	29
4.2.1	Energy Poverty	30
4.2.2	Linking Sustainable Energy and Climate Change	30
4.2.3	The Energy and Water Nexus	31
4.3	Biomass Use in Developing Countries	32
4.3.1	Indoor Air Pollution and Global Warming	33
4.3.2	Contribution towards Deforestation	34
4.4	Factors which Influence the Choice in Energy Sources and Cooking Technology Choices	35
4.4.1	Energy ladder model	35
4.4.2	Fuel Switching Model	37
4.4.3	Fuel Stacking and Multiple stove use	38
4.5	Social Perceptions towards renewable energy technologies	39
4.6	Clean Cookstove Initiatives in Developing Countries	41
4.7	Critical Success Factors for the Successful Implementation of Clean Cookstove Initiatives	47
4.7.1	Investing in Research, Technology and Skills Development	47
4.7.2	Stakeholder Consultation	49
4.7.3	Cost of Clean Cookstoves	50
4.7.4	Distribution Networks and Marketing	50
4.7.5	Institutional Setup	51
4.7.6	Measurement and Monitoring	52
4.8	Conclusion	52
5	CHAPTER FIVE: SURVEY RESULTS	54
5.1	LUSLM Project Area Household Demographic Profile	54
5.2	Household Energy Profiles: Fuel and Technology Used in Cooking	55
5.3	Uptake of Clean Cookstoves	59

5.3.1	Level of Knowledge of Clean Cookstoves	59
5.3.2	Ownership of Clean Cookstoves	61
5.3.3	Perception of Clean Cookstoves in the Survey Area	61
5.4	Conclusion	66
6	CHAPTER SIX: ANALYSIS OF RESULTS	67
6.1	Fuel Use in the Siphofaneni Area	67
6.2	Current Cooking Technologies in the Siphofaneni Area	69
6.3	Cooking practices in the Siphofaneni Area	70
6.4	Swaziland’s Clean Cookstove Programme	70
6.5	Perceptions of Clean Cookstoves in the Siphofaneni area	72
6.6	Barriers to Implementation of Clean Cookstove Initiatives in Swaziland	74
6.7	Conclusion	76
7	CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS	77
7.1	Conclusions	77
7.2	Recommendations	79
	References	80
	Annexes	106

LIST OF TABLES

Table 3.1: Table Showing the Number of Households Sampled in each Section.....	20
Table 4.1: Share of Population without Access to Modern Energy Services by Region in 2010. Source: IEA, 2012.....	26
Table 5.1: Primary Cooking Fuels in the Survey Area.....	55
Table 5.2: Most Preferred Alternative Cookstove Used in the Survey Area.....	58
Table 5.3: Advantages and Disadvantages of Clean Cookstoves.....	62
Table 5.4: Preferred Material Attributes for Clean Cookstoves.....	63
Table 5.5: Clean Cookstove Price Range Preferences.....	66

LIST OF FIGURES

Figure 2.1: Swaziland's Energy Mix in 2012 (GOS, 2012).....	10
Figure 2.2: Map showing the Location of Sampled Area.....	15
Figure 2.3: Flow chart of research design and methodology to be followed.....	18
Figure 4.1: Percentage of Households using Different Types of Energy for Cooking by Inome Quintile (GOS, 2001; 2010).....	27
Figure 4.2: Energy Ladder Model (Heltberg, 2004).....	36
Figure 4.3: Basithuthu Stove (GOS, 2014).....	45
Figure 4.4: Vesto Stove (GOS, 2014).....	46
Figure 4.5: Modified Welcome Dover Stove (GOS, 2014).....	46
Figure 4.6: Lion (Institutional) Stove (GOS, 2014).....	47
Figure 5.1: The fuel mix for cooking in the survey area.....	56
Figure 5.2: Percentage of Households which use Open Fires as Main Cooking Technologies. .	57

Figure 5.3: Level of Knowledge of Clean Cookstoves in the Survey Area.....	59
Figure 5.4: Source of Knowledge on Clean Cookstoves in the Survey Area.	60
Figure 5.5: Ownership of Clean Cookstoves in the Survey Area.	61
Figure 5.6: Graph of Household Preference of Clean Cookstoves and Willingness to Pay.	64
Figure 5.7: Graph of Maximum Price Ranges in Emalangeneni which Households are willing to Spend on Purchasing a Clean Cookstove. (1 Emalangeneni = 1 Rand).	65

ACRONYMS

CO ₂	Carbon Dioxide
CO	Carbon Monoxide
CTC	Consultancy and Training Centre
CH ₄	Methane
DFID	Department for International Development
ESMAP	Energy Sector Management Assistance Programme
FAO	Food and Agriculture Organisation
GEF	Global Environment Fund
GIS	Geographic Information System
GOS	Government of Swaziland
GDP	Gross Domestic Product
Gt	Giga tonnes
HIV/AIDS	Human Immune Deficiency Virus
IEA	International Energy Agency
IFAD	International Fund for Agricultural Development
IPCC	International Panel on Climate Change
LPG	Liquefied Petroleum Gas
LUSLM	Lower Usuthu Sustainable Land Management
M.A.S.L	Metres above sea level
NGO	Non-Governmental Organisation
PM	Particulate Matter
ProBEC	Programme on Basic Energy Conservation
SADC	Southern African Development Community
SABONET	Southern African Botanical Diversity Network
SLM	Sustainable Land Management
SSA	Swaziland Sugar Association

SWADE	Swaziland Water and Agricultural Development Enterprise
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nation Environmental Programme
UNF	United Nations Foundation
UNFCCC	United National Framework Convention on Climate Change
UNISWA	University of Swaziland

GLOSSARY

Energy governance: refers to the actors, institutions and processes involved in decision making on energy service provision Energy governance also takes into account affordability of energy services as well as the quality of the energy services being provided.

Energy poverty: refers to a lack of access to modern energy services and facilities for lighting and cooking which negatively affects quality of life. The energy poverty nexus describes the linkages between poverty and energy which require a systematic approach to developing solutions, resources allocation to ensure sustainable development.

Modern Energy: refers to energy sources which are clean burning and efficient such as electricity and gas.

Sustainable development: refers to development that meets the current generation in a manner which does not compromise the ability of future generations to meet their needs.

Sustainable energy: is energy derived from resources which cannot be depleted and without compromising the need for future generations to meet their energy needs.

Water, energy and climate nexus refers to the interlinkages between the water security, energy security and climate change sectors in the development agenda, where actions in one sector have impacts in one or both of the sectors.