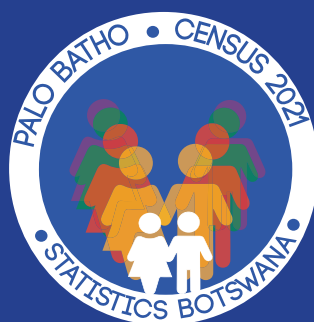




Mpala, Ke Botlhokwa

HEATING SPACE AMONG HOUSEHOLDS

2022 PHC Dissemination Seminar

K. Rasedibo



Republic of Botswana



Heating Space Among Households

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Outline

- Introduction/Motivation
- Methodology
- Results
- Conclusions and Implications

Introduction/Motivation

- Botswana's commitment to social and economic development has been demonstrated, among others, through adopting the 2030 Agenda for Sustainable Development Goals, Vision 2036 and national development plans
- This paper focuses on SDGs 7 and 12, which are about access to affordable, reliable, sustainable, and modern energy for all and ensuring sustainable consumption and production patterns (Republic of Botswana and United Nations, 2020)
- Evidence on this issue has been extensively explored in the developed world (Stolyarova et al., 2015; Laureti and Secondi, 2012; Curtis et al., 2017). Some who considered a panel of developing countries (Kojima, 2021) did not cover Botswana. Locally, work has been to descriptively explore access.



Methodology

- The study uses the 2022 population and housing census data. It focuses on the source of energy for heating, obtained by asking household members to indicate the types they had.
- To explore the association between access to heating space and some variables, the study uses a regression approach.
- Since the dependent variable is binary (1 if the household reported energy source and 0 otherwise), a binary regression model is adopted)
- Furthermore, the study also investigated the determinants of the **choice** of heating space type through the multinomial logistic regression approach. This model estimates the likelihood of household *i* choosing heating space.

Results

Table 1. Principal Source of Energy for Heating Space:2001-2022

Source	2001 Share (%)	2011 Share (%)	2017 Share (%)	Frequency	2022 Share (%)
Electricity	8.30	16.75	20.56	211802	30.4
Diesel/ Petrol Generator		0.12	-	229	0.0
Solar Home System	0.14	0.14	0.06	2062	0.3
LPG	2.36	1.02	0.77	9658	1.4
Bio-Gas	-	0.06	-	3281	0.5
Kerosine/Paraffin	1.69	0.26	0.18	1313	0.2
Coal	0.13	0.13	0.04	1940	0.3
Charcoal	0.15	0.15	0.07	2562	0.4
wood	28.44	47.66	27.24	175526	25.2
Crop Waste/Shrubs		-	-	717	0.1
Animal waste/dung	0.16	0.05	0.01	488	0.1
None	28.44	33.6	50.65	270835	38.9
Other	0.79	0.06	0.42	15123	2.2
Total	70.6	100	100	695536	100

Access by Gender of Household Heads

Source	M	F
Electricity	30.7	30.2
Diesel /Petrol Generator	0.0	0.0
Solar Home System	0.3	0.2
LPG	1.4	1.4
Bio Gas	0.5	0.5
Kerosine/Paraffin	0.2	0.2
Coal	0.3	0.3
Charcoal	0.4	0.3
wood	25.6	24.8
Crop Waste/Shrubs	0.1	0.1
Animal waste/dung	0.1	0.1
None	38.3	39.8
Other	2.2	2.2
Total	100	100

Access by Geography (Districts)

Districts	ELEC	SOL	LPG	BIO	PAR	CO	CCO	WO	CW	AW	OTHE	PD	Total
Gaborone	87.2	.6	2.7	.8	.1	.2	.2	3.7	0	0	4.5	1	100
Francistown	76	.6	1.5	1.3	.4	.6	.3	13.2	0	.1	5.7	0	100
Lobatse	70.9	.1	6.3	.9	.3	.6	.1	15.7	0	.1	5.1	0	100
Phikwe	65.9	.1	1.1	.3	0	.2	.6	20.5	.1	.1	11.0	0	100
Orapa	95.3	3.6	.5	0	0	0	0	0.1	0	0	.5	0	100
Jwaneng	90.6	.5	2.5	.3	0	.1	0	4.2	0	0	1.7	0	100
Sowa	94.9	0	0	0	0	0	0	3.2	0	0	1.9	0	100
Ngwaketse	38.0	.3	3.0	.5	.4	.3	.6	53.7	.2	.2	2.7	0	100
Barolong	27.7	.1	1.4	.3	.4	.3	.3	66.5	.1	.2	2.7	0	100
Ngwaketse WE	12.9	.3	.8	.2	.2	.3	.5	81.5	.3	.2	2.9	0	100
South E	70.6	.3	2.8	1.0	.1	.2	.9	21	.2	.1	2.8	.1	100
Kweneng East	57.6	.6	5.0	1.4	.4	.7	.4	31.0	.2	.1	2.6	.1	100
Kweneng West	13.9	.2	1.0	.7	.1	.2	.6	81.4	.2	.2	1.4	.1	100
Kgatleng	53	.5	1.3	1.4	.4	.3	.7	39.6	0	.1	2.6	0	100
CS Palapye	40.4	.2	1.5	.8	.3	.6	.5	51.2	.2	.2	4.1	0	100
C Mahalapye	31.0	.5	1.5	.4	.5	.5	.8	62.0	.4	.1	2.3	0	100
C Bobonong	31.3	.2	1.0	.2	.5	.3	.6	62.6	.2	.1	2.9	0	100
C Boteti	35.4	.4	2.0	.3	.2	.5	.8	53.0	.3	.5	6.7	1	100
C Tutume	31.6	.7	1.3	.9	.7	1.0	1.0	60.1	.2	.1	2.3	0	100
North E	36.6	.2	.9	.3	.1	.2	.7	55.6	.1	.1	5.4	0	100
Ngam E	47.0	.5	1.9	.6	.1	.3	.4	44.4	.1	.1	4.6	0	100
Ngam W	18.0	.7	.4	.2	.7	.5	1.0	72.2	.5	.3	5.4	.1	100
Chobe	65.1	1.6	1.5	.9	.1	.6	.9	24.1	.1	.2	4.7	.2	100
Delta	0.0	1.2	0	.6	0	0	0	97.6	.6	0	0	0	100
Ghanzi	29.5	1.1	1.2	.3	.3	1.1	2.3	58.9	.1	.1	4.9	.2	100
CKGR	0	1.3	0	0	0	1.3	0	93.3	0	0	0	4	100
Kgal South	33.9	.5	3.2	.3	.2	.1	.4	59.9	.3	.2	1.2	.1	100
Kgal North	36.7	.4	.9	.1	.0	.4	1.1	58.1	.2	.0	2.1	.0	100

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Binary regression results

Parameters	Coefficients	Std Error	p Value
Intercept	-1.020	.045	.000
Traditional	-.381	.037	.000
Mix	0.032	.036	.366
Detached	.465	.035	.000
Semi-Detached	.520	.372	.000
Town House	-.023	.042	.588
Rooms	.848	.035	.000
Other	-.304	.037	.000
SexHH (1=Male)	-.038	.005	.000
MarriedH	-.184	.006	.000
EDU=None	.173	.0108	.000
EDU=Primary	.234	.0087	.000
EDU=Secondary	.259	.0065	.000
EDU=Non Formal	.164	.0239	.000
AgeH	-.005	.0002	.000
Observations	695246		
Log Likelihood	-111122.14		
LR Chi(44)	30362.018		
P>Chi2	0.000		

Multinomial Logistic regression results

Parameters	SOL	LPG	BIO	PAR	CO	CCO
Intercept	-4.774*** (.144)	-3.840*** (.84)	-4.706*** (.139)	-5.131*** (.180)	-4.890*** (.152)	-4.418*** (.126)
Mix	-0.577*** (.144)	0.119* (.073)	0.134*** (.115)	-0.419*** (.093)	-0.556*** (.079)	-1.079*** (.0063)
Det	-0.960*** (.126)	-0.150** (.069)	-0.291*** (.110)	-1.541*** (.096)	-1.600*** (.080)	-1.830*** (.600)
Sdet	-0.636*** (.126)	-0.136* (.083)	-0.781*** (.150)	-1.943*** (.231)	-1.841*** (.168)	-1.903*** (.129)
Townh	-0.370*** (.164)	0.157* (.102)	-0.520*** (.192)	-1.798*** (.357)	-1.658*** (.250)	-2.076*** (.235)
Rooms	-0.501*** (.107)	0.808*** (.070)	0.196* (0.112)	-0.931*** (.101)	-1.381*** (.089)	-1.662*** (.069)
Other	-0.450*** (.129)	-0.406*** (.091)	-0.304*** (.141)	-1.094*** (.162)	-0.913*** (.118)	-0.828*** .078
AgeH	0.003* (.002)	-0.002*** (.001)	-0.003** (.001)	-0.003*** (.002)	-0.001* (.002)	-0.001* (.001)
SexH	0.313* (.042)	-0.077*** (.021)	-0.028** (.037)	0-.025* (.055)	0.219*** (.048)	.197*** (.039)
MarriedH	-0.056* (.047)	-0.166*** (.025)	-0.203*** (.045)	-0.476*** (.074)	-0.249*** (0.058)	-0.188*** (.048)
None	0.111* (.099)	0.649*** (.045)	0.583*** (.079)	1.899*** (.113)	1.600*** (0.92)	1.546*** (.076)
Primary	0.113* (.074)	0.687*** (.036)	0.598*** (.062)	1.263*** (.106)	1.216*** (.082)	1.312*** (.067)
Secondary	0.192*** (.046)	0.623*** (.025)	0.501*** (.045)	0.944*** (.091)	0.685*** (0.71)	0.714*** (.059)
Non-Formal	0.052* (.224)	0.629*** (.101)	0.690*** (.163)	1.132*** (.244)	0.961*** (.211)	1.466*** (.148)

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6/19/24



Parameters	WO	CW	AW	OTHE	PD
Intercept	-0.797*** (.027)	-4.797*** (.218)	-5.564*** (.255)	-2.864*** (.062)	-6.994*** (.407)
Mix	-0.545*** (.019)	-1.881*** (.091)	-2.209*** (.103)	0.109*** (.053)	0.255* (.316)
Det	-1.586*** (.018)	-3.135*** (.099)	-2.683*** (.097)	-0.274*** (.049)	-0.167* (.300)
Sdet	-1.987*** (.028)	-3.377*** (.306)	-3.084*** (.290)	-0.307*** (.063)	-0.884** (.451)
Townh	-1.681*** (.040)	-3.134*** (.514)	-2.279*** (.397)	-0.731*** (.095)	0.253* (.479)
Rooms	-1.312*** (.020)	-2.206*** (.101)	-2.323*** (.112)	0.604*** (.049)	-0.097* (.315)
Other	-0.615*** (.023)	-0.914*** (.106)	-0.664*** (.106)	-0.283*** (.065)	-0.159* (.376)
AgeH	-0.001**** (.000)	-0.006*** (.002)	-0.004*** (.003)	-0.006*** (.001)	-0.006* (.005)
SexH	0.167*** (.008)	0.243*** (.065)	0.098* (.067)	0.071*** (.018)	.273*** (.122)
MarriedH	-0.272*** (.009)	-0.407*** (.088)	-0.242*** (.090)	-0.320*** (.022)	0.001* (.142)
None	1.844*** (.016)	1.853*** (.132)	1.755*** (.141)	0.722*** (.039)	0.493** (.240)
Primary	1.540*** (.013)	1.153*** (.127)	1.228*** (.132)	0.667*** (.030)	0.051*** (.212)
Secondary	0.861*** (.010)	0.783*** (.113)	0.813*** (.118)	0.456*** (.021)	0.069* (.139)
Non-Formal	1.486*** (.033)	2.111*** (.2010)	1.530*** (.250)	0.522*** (.088)	0.540* (.534)

Conclusion and Implications

- This study investigated households` sources of energy for housing using household data from the 2022 population and housing census.
- The increase in electricity implies that efforts to ensure improved access to electricity could be bearing fruit.
- As established in the literature, the declining trends in using sources such as wood imply a positive externality since such sources harm the environment.
- The considered household variables affect both access and choice of heating spaces, implying their importance in any efforts to ensure access to modern sources

Thank You

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