

# **Impact of Implementing Renewable Energy in Power Distribution and Agriculture on Achievement of Sustainable Development Goals (SDGs) in Africa: Case Study of Northern Nigeria**

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# Presentation Overview

- Context of Sub-Saharan Africa (slide 3)
- SDGs and sectors (slide 4)
- Sectors in Nigeria (slide 5-9)
- Aims and Objectives (slide 10)
- Methods (slide 11)
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- Further work (slide 17)

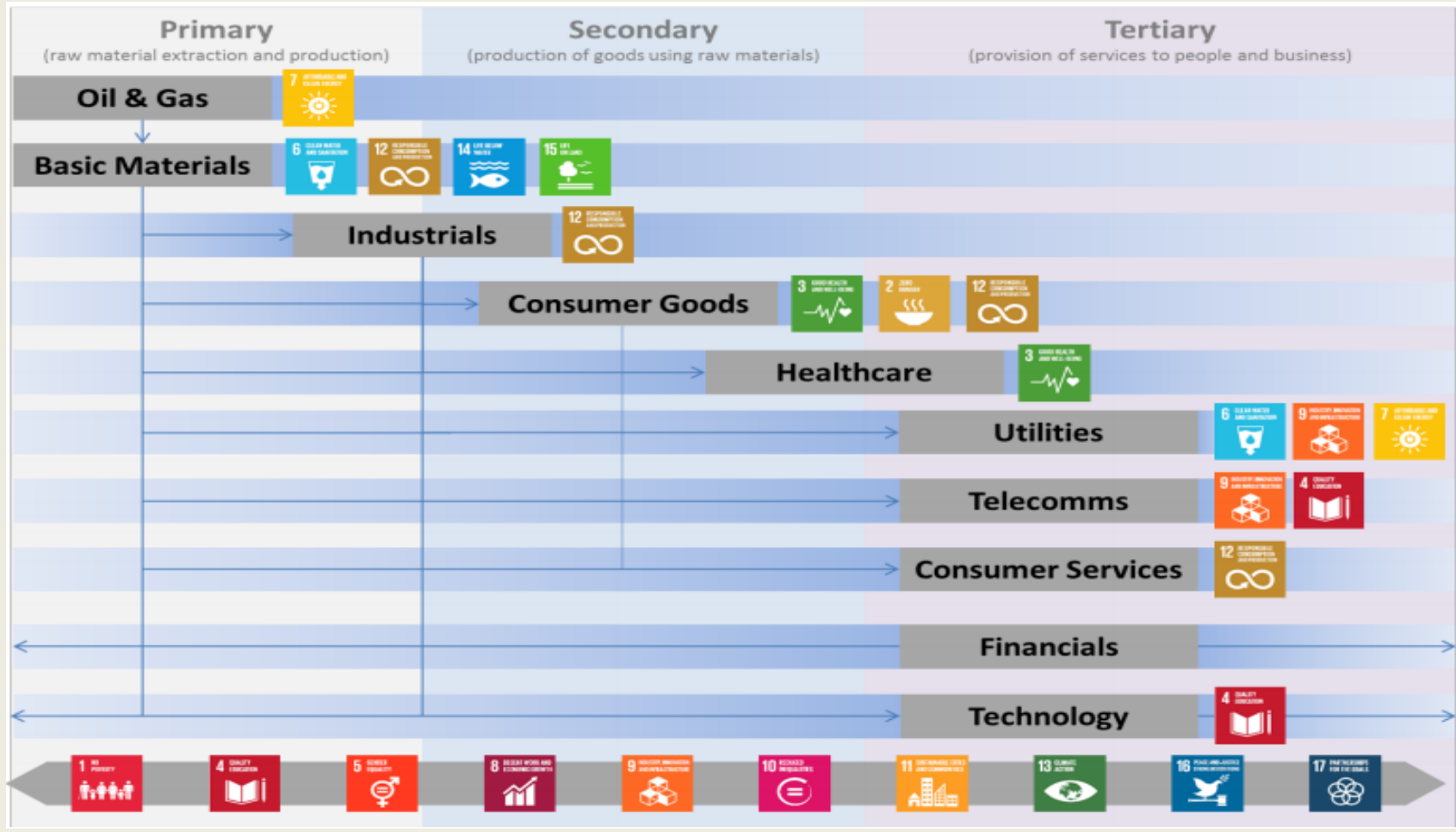
## Sub-Saharan Africa at a Glance

- 1 billion people
- Agriculture is main employer of labor
- Full agricultural potential not exploited
- 422 million people living below the poverty line of \$1.90 per day
- Lack of financial independence affecting energy sector



# SDGs and Sectors

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SOURCE: <http://s3.amazonaws.com/aws-bsdc/SDG-Sectors.pdf>

# Study Background

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- Largest economy and population in Africa
- 41% of population living below poverty line and unemployment is at 23.1%
- 41% electricity access
- Commerce affected due to socio-economic challenges
- Energy sector affected negatively due to lack of liquidity

SOURCE: <https://www.oasdom.com/map-nigeria-with-states/>

# Agriculture in Nigeria

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- Largest sector employing 48.2% of total workforce
- Means of livelihood for farmers
- Irrigation via rainfed or diesel pumps
- Diesel pump method is very expensive, not eco friendly and requires maintenance most times

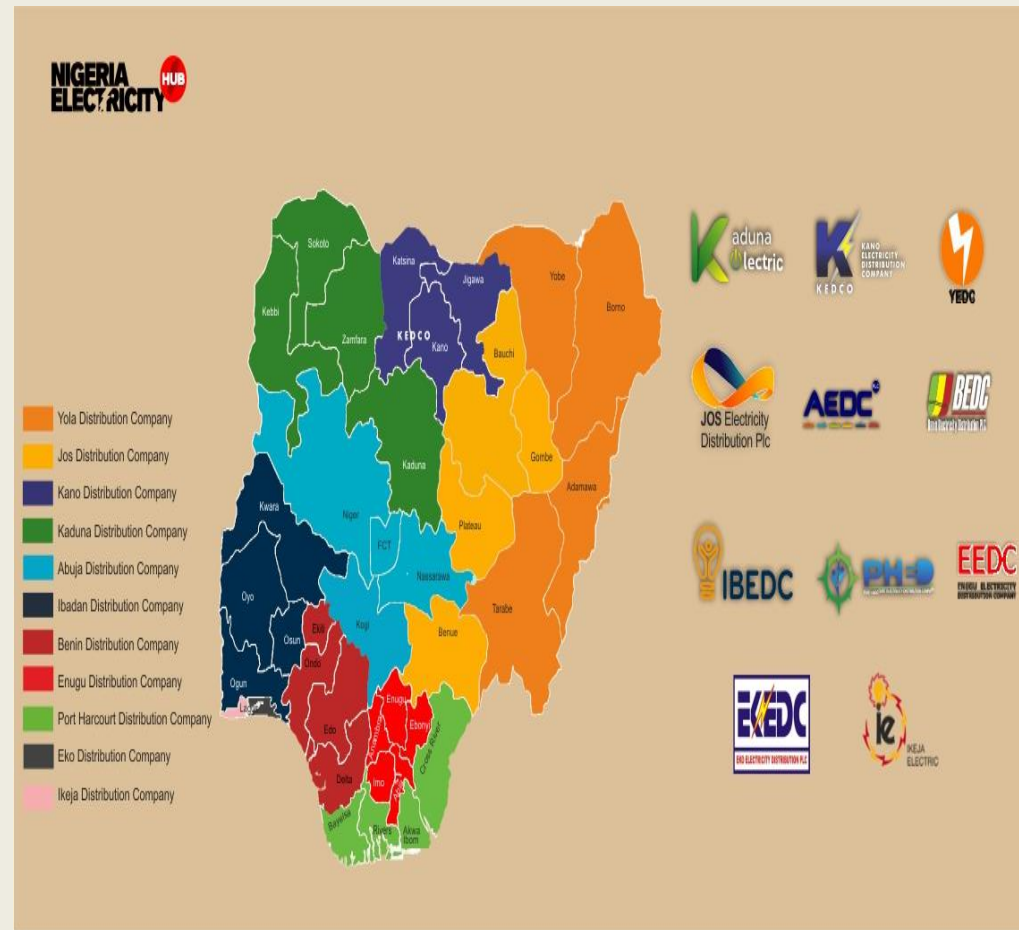




# Nigeria Energy Sector (Power Distribution)

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- Divided into 11 after privatization
- Aggregate Technical Collection and Commercial loss (ATC&C) percent of 72% average
- Over \$2Billion USD owed to Nigeria Bulk Electricity Trader (NBET)



## Nigeria Energy Sector (Power Distribution) cont'd...

- Kaduna Electric (KAEDCO) has collection efficiency of 17%
- ATC&C loss percent of 74%
- Average 15% monthly payment to NBET
- 90% of customers on R2 (1 – 40 kW) tariff class
- 67% of R2 customers are farmers
- R2 collection efficiency less than 16%

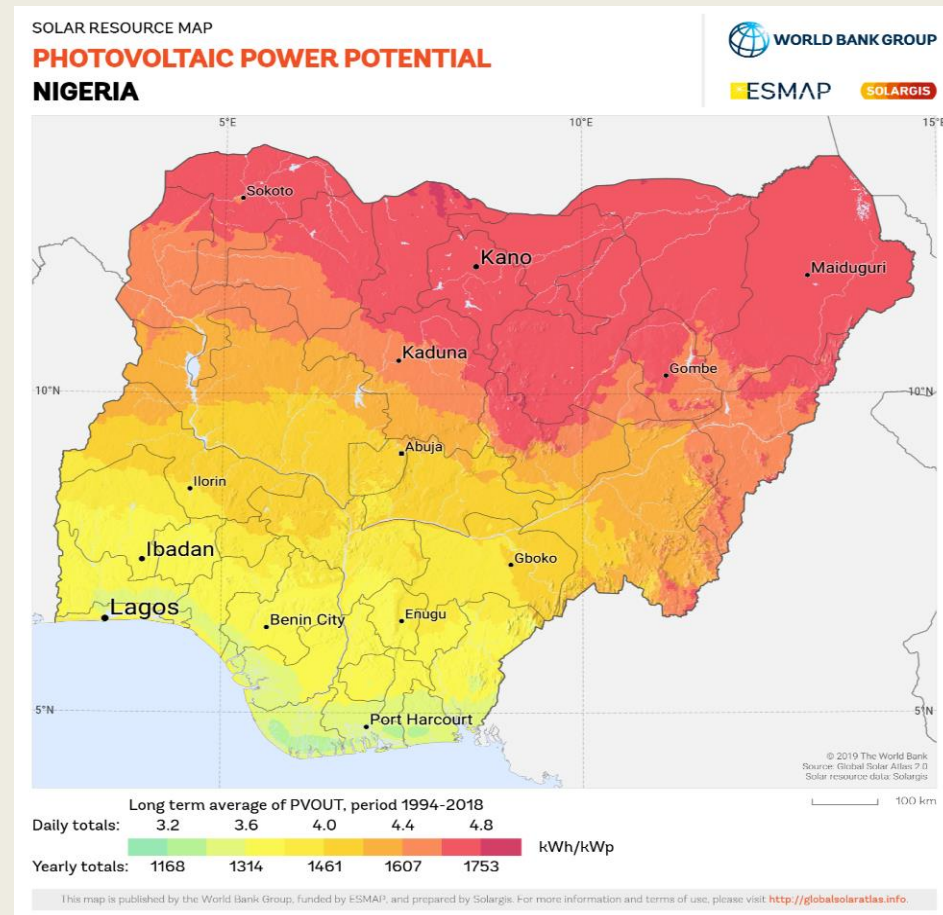




# Potential of Energy Generation via Renewable Energy

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- Potential established by multiple studies
- Free and clean source of energy
- Solar radiation average of 19.8 Mj/m<sup>2</sup>/day
- Average sunshine hours of 6hrs/day
- Water production potential via RET



# Study Aims and Objective

AIM:

Establish why customers do not pay their full electricity bills

OBJECTIVE:

Investigate current demographic and socio-economic situation in the KAEDCO area and evaluate the potential of RET to improve payments to power utility companies



# Methodology

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Mixed Methods  
Approach

- Contingent Valuation Method (CVM)
- Choice Experiment (CE)
- Questionnaire (face to face)



# Results (Main Occupation)

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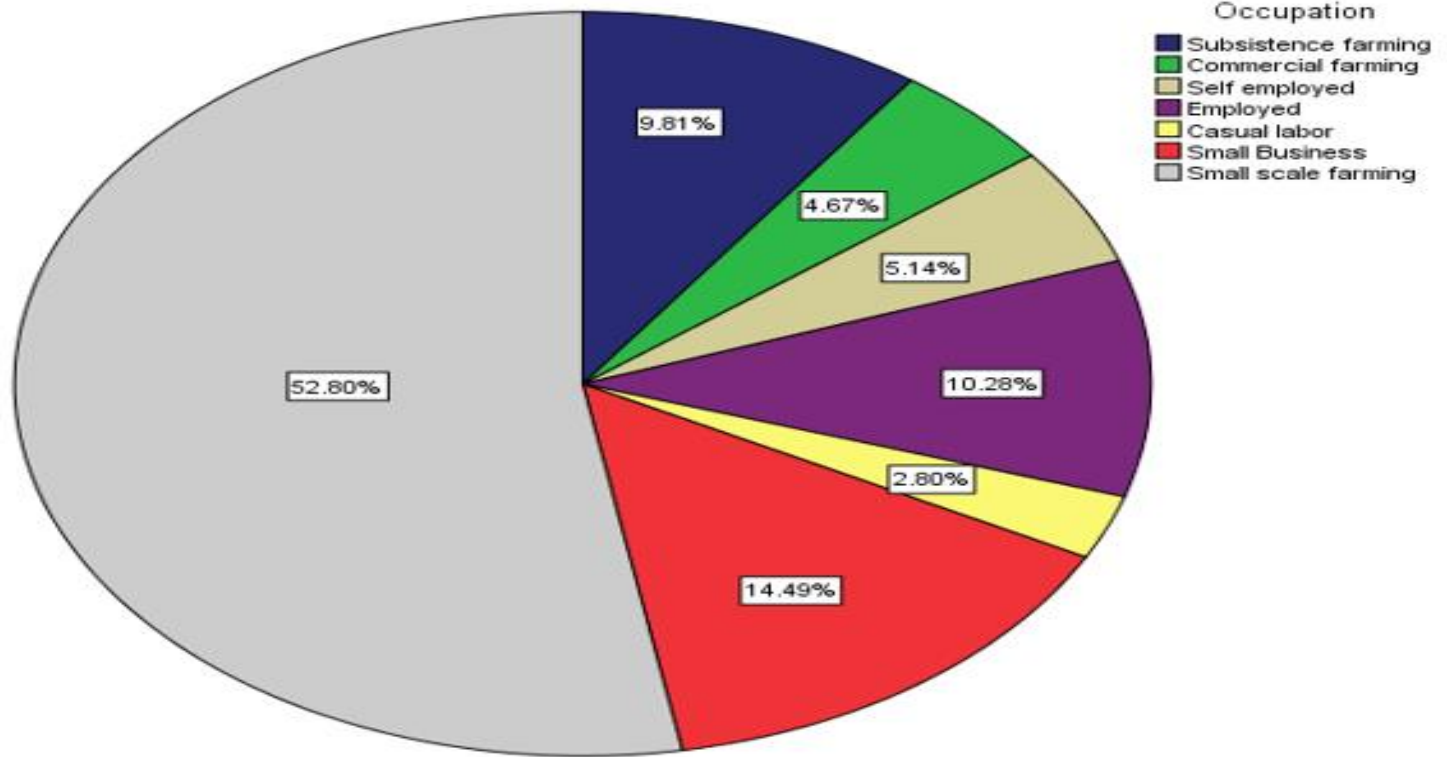
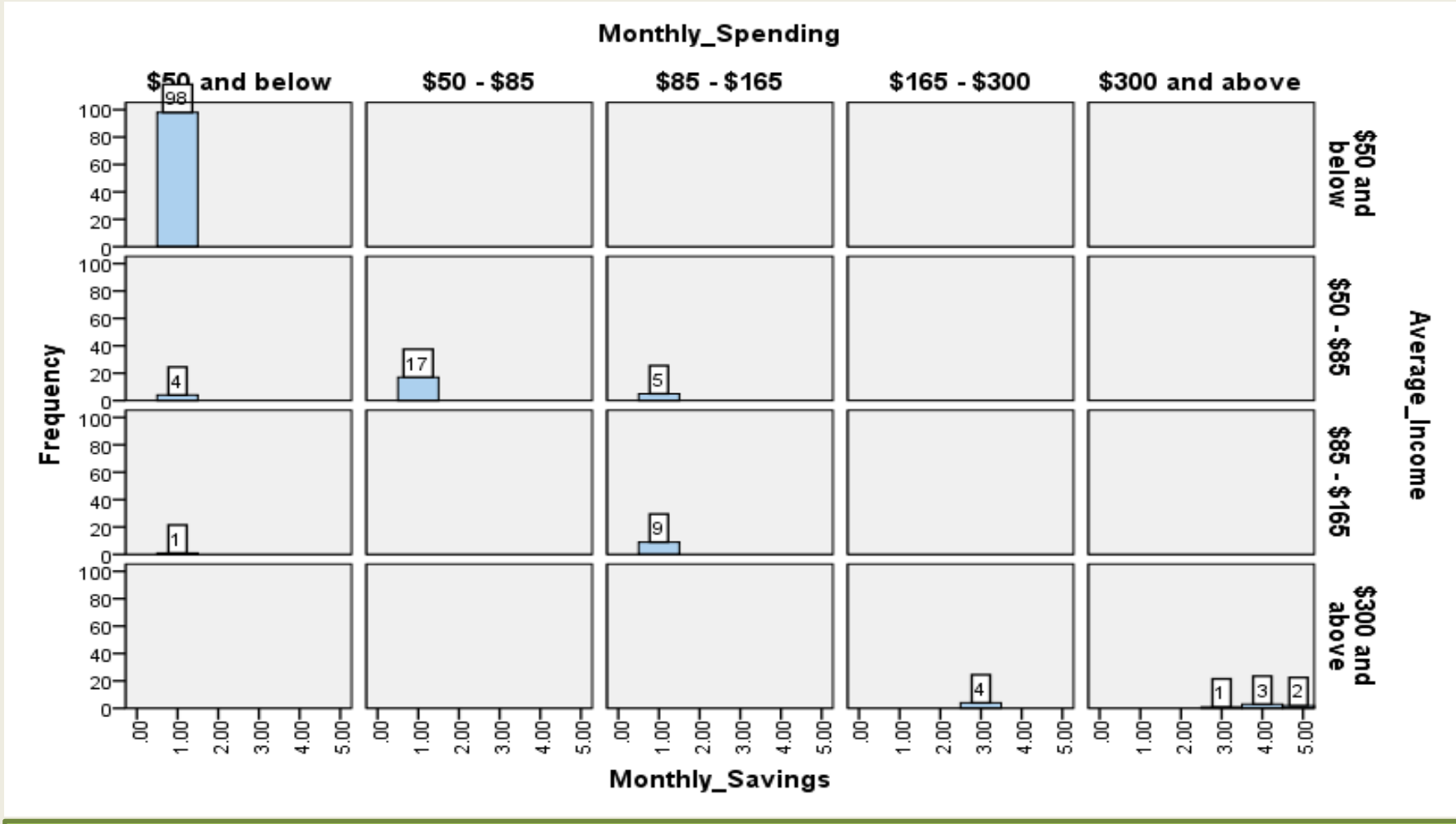


Figure 5.1: Main occupation of household, n=214

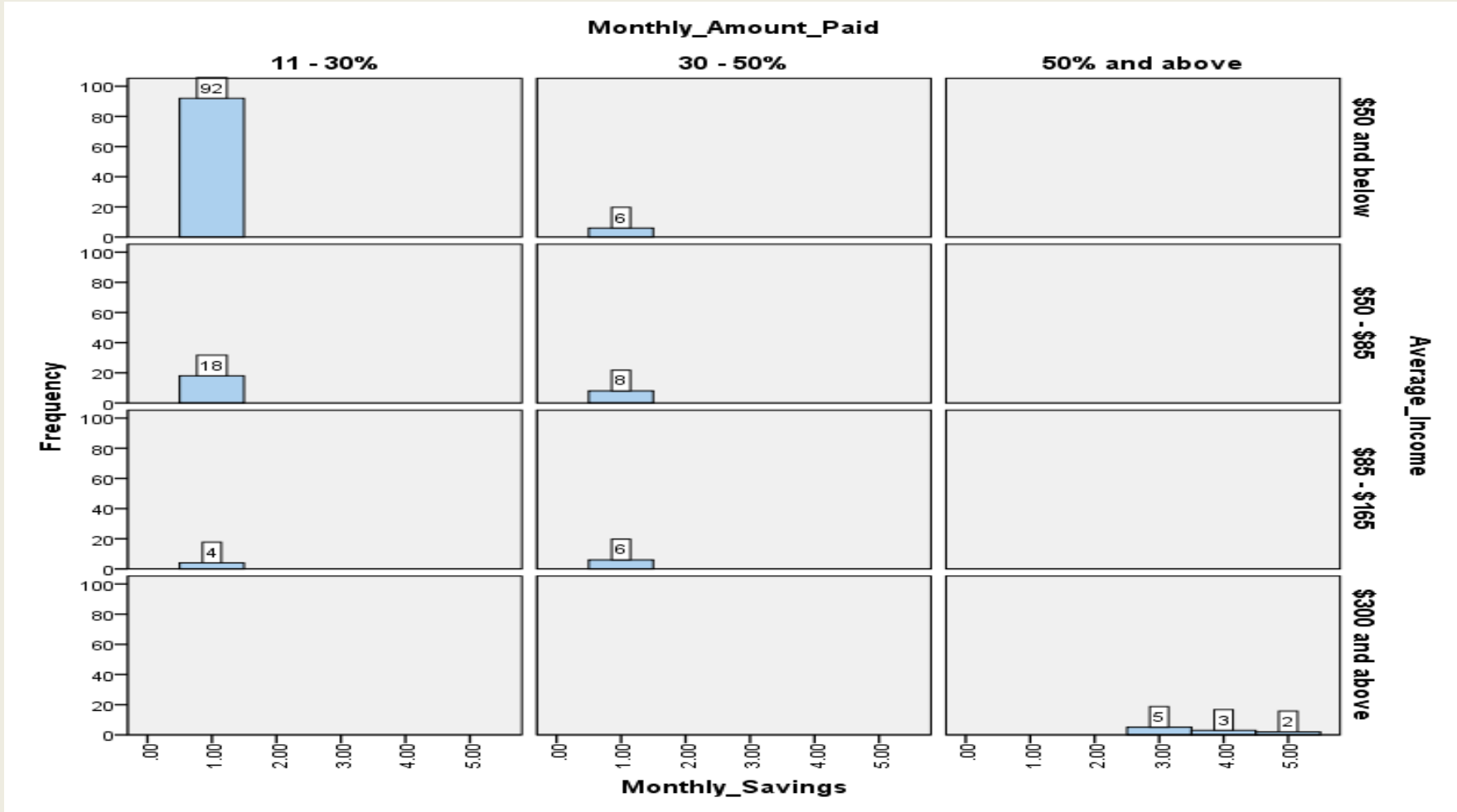
# Results (Income Analysis)

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# Results (Average Monthly Electricity Payment)

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# Spearman's rho Analysis

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			Average Income	Monthly Amount Paid	Occupation	Monthly Savings	Education	Home Type	Occupants
Spearman's rho	Average Income	Correlation Coefficient	1.000	.617**	.503**	.534**	.031	.093	.043
		Sig. (2-tailed)	.	.000	.000	.000	.118	.074	.611
		N	144	144	144	144	144	144	144
Monthly Amount Paid	Monthly Amount Paid	Correlation Coefficient	.617**	1.000	.493**	.622**	.063	.082*	.085
		Sig. (2-tailed)	.000	.	.000	.000	.453	.029	.312
		N	144	144	144	144	144	144	144
Occupation	Occupation	Correlation Coefficient	.503**	.493**	1.000	.607**	.053	.054	.129
		Sig. (2-tailed)	.000	.000	.	.000	.524	.519	.123
		N	144	144	144	144	144	144	144
Monthly Savings	Monthly Savings	Correlation Coefficient	.534**	.622**	.607**	1.000	.037	.092	.045
		Sig. (2-tailed)	.000	.000	.000	.	.659	.272	.590
		N	144	144	144	144	144	144	144
Education	Education	Correlation Coefficient	.521	.443	.533	.427	1.000	.438	.465
		Sig. (2-tailed)	.118	.453	.524	.659	.	.352	.064
		N	144	144	144	144	144	144	144
Home Type	Home Type	Correlation Coefficient	.093	.182*	.054	.092	.078	1.000	.018
		Sig. (2-tailed)	.074	.029	.519	.272	.352	.	.831
		N	144	144	144	144	144	144	144
Occupants	Occupants	Correlation Coefficient	.043	.085	.129	.045	.015	.018	1.000
		Sig. (2-tailed)	.611	.312	.123	.590	.064	.831	.
		N	144	144	144	144	144	144	144





# Conclusion

- Poor revenue for power utility companies caused by lack of financial independence
- RET has a potential to increase income generation
- Process aligned with SDGs and would help achieve targets 1, 2, 7, 8, 11 and 13



# Further Work

- Calculate actual economic cost for implementing the RET system and savings therefrom
- Calculate actual green house gas emission from current practice of irrigation via diesel pumps





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# THANK YOU

# Any Questions?

