



(RESEARCH ARTICLE)



Comparative Study of Low-Carbon Lifestyle for Urban Residents in Huainan, China and Ondangwa, Namibia

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Abstract

This study looks at the low-carbon lifestyles of people living in cities in Huainan, China, and Ondangwa, Namibia, and compares them. The goal is to find out how different social, economic, infrastructural, and policy frameworks affect environmentally friendly behaviors in these different cities. We used a mixed-methods research methodology that included surveys of households, in-depth interviews, and direct observation to gather information on energy use, transportation modes, waste management, consumption patterns, and public awareness of environmental issues. The results show that the people of Huainan benefit from a lot of government help, digital infrastructure, and educational outreach that encourages green behaviors. On the other hand, the people of Ondangwa mostly rely on traditional practices, community initiatives, and resource-saving behaviors that they have to do. The report ends with policy suggestions that are specific to each city. It stresses the need for localized policies, community education, and long-term investments in infrastructure to encourage low-carbon living.

Keywords: Low-Carbon Techniques; Sustainable Development; Climate Change Mitigation; Urban sustainability are some of the terms used.

1. Introduction

Climate change is a problem that affects the whole world and needs everyone to work together quickly. Cities, which are centers of business and human density, are among of the biggest sources of carbon emissions. So, it's very important for people who live in cities to adopt low-carbon lifestyles in order to cut down on greenhouse gas (GHG) emissions around the world. A low-carbon lifestyle is making choices and doing things every day that help minimize your carbon footprint. For example, you can use less energy, use public transportation, throw away less, and be more aware of what you buy. To create effective techniques that encourage sustainable living, it is important to know what causes these behaviors[1].

This study compares low-carbon lifestyles in two cities with different social, economic, and geographic profiles: Huainan, a city in eastern China known for its industrial base and changing green transition, and Ondangwa, a small but growing town in northern Namibia that is adapting to environmental and infrastructure problems.[2] This comparison gives us a new way to look at how things like national legislation, infrastructure, income levels, cultural values, and environmental awareness affect the choices and actions of people who live in cities.[3]

1.1. Relevance of Urban Sustainability

Urban sustainability is becoming more and more important since cities are not only major sources of pollution, but they are also centers for new green technologies. To reach bigger climate goals, it's important to encourage low-carbon

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behavior at home. Researchers and policymakers can learn more about what encourages or discourages sustainable behavior in different urban settings by looking into low-carbon lifestyles in cities.[4][5]

1.2. Why Huainan and Ondangwa?

Huainan is a medium-sized city in China that is diversifying its economy. The government is working hard to cut emissions through energy reform, public transit, and environmental programs. On the other side, Ondangwa is a less industrialized African town that has problems with its infrastructure but benefits from community-based sustainability methods that are founded on tradition. The cities were picked to show two very different methods to becoming sustainable: one is structured and based on policies, and the other is organic and focused on the community.

1.3. Objectives of the Study

The major goals of this study are:

- To look at the low-carbon lifestyle choices of people who live in Huainan and Ondangwa.
- To look at how infrastructure, legislation, and culture affect people's ability to live sustainably.
- To look at important areas of behavior, such as energy usage, transportation, waste management, and environmental awareness.
- To give evidence-based suggestions for encouraging low-carbon lifestyles that are specific to each city.

1.4. Structure of the Paper

This paper is organized as follows:

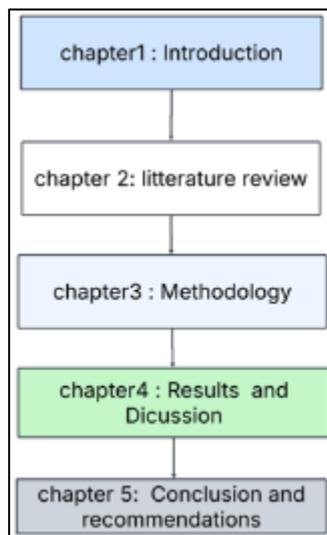


Figure 1 Structure of the paper

The study's goal is to add to the increasing body of information on sustainable urban development and to give politicians, city planners, and environmental advocates working in both high- and low-income areas insights that are relevant to their situations.

2. Literature Review

There are several things that can affect low-carbon lifestyles in cities, including as government policy, technical infrastructure, public awareness, and social and cultural standards. The Chinese government has made a promise to reach peak carbon emissions by 2030 and carbon neutrality by 2060. To help with this, they have [6]put in place a number of policies and experimental projects that encourage low-carbon consumption, public transit, and energy efficiency.

Li et al. (2020) and Zhang & Chen (2021) are two studies that show how national policies can change how people act in cities, especially in cities with strong infrastructure[7].

On the other hand, studies of African metropolitan centers show that there aren't many centralized low-carbon policies and that the infrastructure isn't very good, which makes it hard to make big, long-lasting changes[8].

But Mufeti's (2018) research and the Namibia Environmental Investment Fund's (2022) findings reveal that traditional knowledge, community practices, and new grassroots efforts can all help people act in ways that are better for the environment [10][11]. These observations show that top-down policy works in some situations, but bottom-up community-driven efforts are just as important in places with few resources.

3. Methodology

This study uses a structured mixed-methods strategy that includes both collecting and analyzing quantitative and qualitative data [12][13]. The method was carefully planned to make sure that the comparison of low-carbon lifestyle practices in Huainan and Ondangwa was strong and took into account the differences between the two places.

3.1. The Plan for the Research

The study is based on a comparative case study model. This makes it possible to look closely at how geographic, social, economic, and policy-driven factors affect sustainable behaviors in two cities with very different cultures. The main topics of study are energy use, transportation habits, waste management, and environmental awareness. These are the main areas of study that the research looks at.

3.2. Data Collection Methods

3.2.1. Quantitative Survey A structured household survey was designed and administered to a sample of 100 urban households in each city. The survey included:

- Likert-scale questions assessing the frequency of environmentally friendly actions
- Multiple-choice and ranking questions on energy sources and transport modes
- Demographic and socio-economic background information
- The survey was translated and culturally adapted: Mandarin for Huainan and English/Oshiwambo for Ondangwa.

Table 1 Survey Structure

A. Household Demographics	Income, education, household size, employment
B. Energy Use	Types of appliances, power sources, efficiency
C. Transport Behaviors	Travel modes, distances, frequency
D. Waste Management Practices	Recycling, composting, disposal methods
E. Environmental Attitudes	Awareness, motivation, exposure to campaigns

3.2.2. Qualitative Interviews Twenty in-depth semi-structured interviews were conducted (10 in each city). Interviewees were purposively selected for their expertise or lived experience in urban sustainability:

- Officials from the city's environmental departments
- People who work for NGOs that teach about the environment
- People who work with teachers, youth leaders, and people who live in informal settlements

People talked about their views on climate change, what stops them from changing their behavior, how easy it is to get to green infrastructure, and what they think of the government's efforts[15].

3.2.3. Field Observation Observational fieldwork was conducted to validate and complement self-reported behaviors. This involved:

- Going to local recycling centers, street markets, and bus and train terminals
- Taking pictures of infrastructure like solar panels, compost bins, and bike lanes
- Keeping track of things like trash, using plastic bags, and riding bikes that are easy to see

Table 2 Observation Checklist Highlights

Observed Factor	Huainan	Ondangwa
Public recycling infrastructure	Smart bins, e-reward	Open bins, minimal
Non-motorized transport lanes	Bike lanes, signage	Mixed-traffic roads
Renewable energy usage	Rooftop solar (few)	Solar lanterns

3.3. Sampling Strategy A stratified random sampling technique was applied to ensure balanced representation

- There were three types of zones in cities: business, residential, and informal settlements.
- Households were chosen in each zone in a fair way.
- We made sure that the people who answered the questions had different levels of income, age, gender, and education.
- In the instance of interviews, a purposive sampling technique found people who had information or roles that were important to low-carbon behaviors.

3.4. Data Processing and Analysis

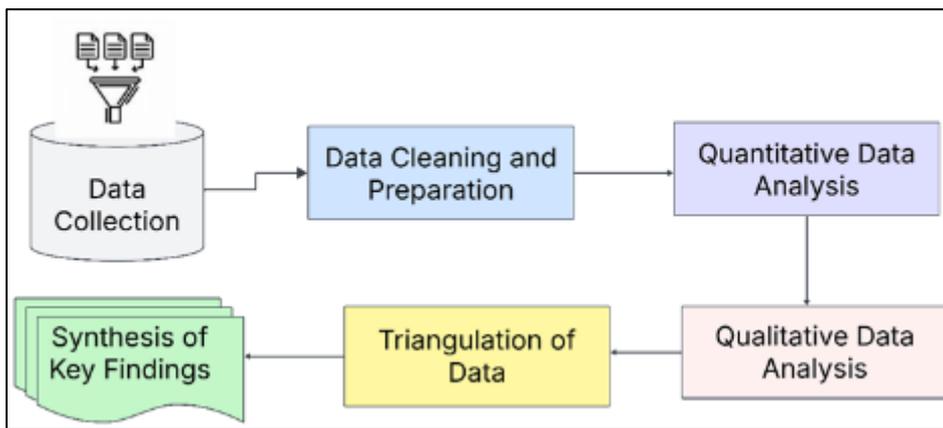


Figure 2 Data Processing and Analysis

3.4.1. Quantitative Analysis Survey data were processed using SPSS and Excel:

- Desggons (means, medians, frequency distributions)
- Bar charts and tables for comparing and contrasting
- We employed cross-tabulations to look for links between demographics and behavior.

3.4.2. Qualitative Analysis Interview transcripts and field notes were transcribed, translated, and coded using NVivo software. Coding categories were developed both inductively and deductively:

- Thematic codes: support for policies, attitudes toward sustainability, and access to resources
- Narrative summaries showed how themes were different and similar in different places.

3.4.3. Triangulation Findings from surveys, interviews, and observations were triangulated to validate conclusions. For example, residents' reports on recycling were cross-checked with field observations at local waste collection points.

3.5. Ethical Considerations Ethical compliance was ensured at every stage:

- All participants gave their written consent.
- Using fake names kept people anonymous.
- The relevant university boards and local governments gave their ethical approval.
- In Ondangwa's informal settlements, special care was taken to make sure that people were respectful when they talked to each other.

3.6. Limitations of the Methodology

- In Ondangwa, it wasn't possible to do surveys online because not many people had access to the internet. Instead, they had to use paper-based surveys. Translation may have made open-ended queries less clear.
- Weather and time limits some neighborhoods have limited field observation hours
- Even with these problems, the way the study was set up made it possible to collect and analyze a lot of data that was rich in context and helped with the goals of this comparative study.

4. Result and Discussion

4.1. Energy Consumption Patterns

Table 3 Consumption patterns

Category	Huainan (%)	Ondangwa (%)
Use of Energy-Efficient Appliances	82	25
Use of Solar Energy	10	22
Use of Wood/Charcoal for Cooking	8	65

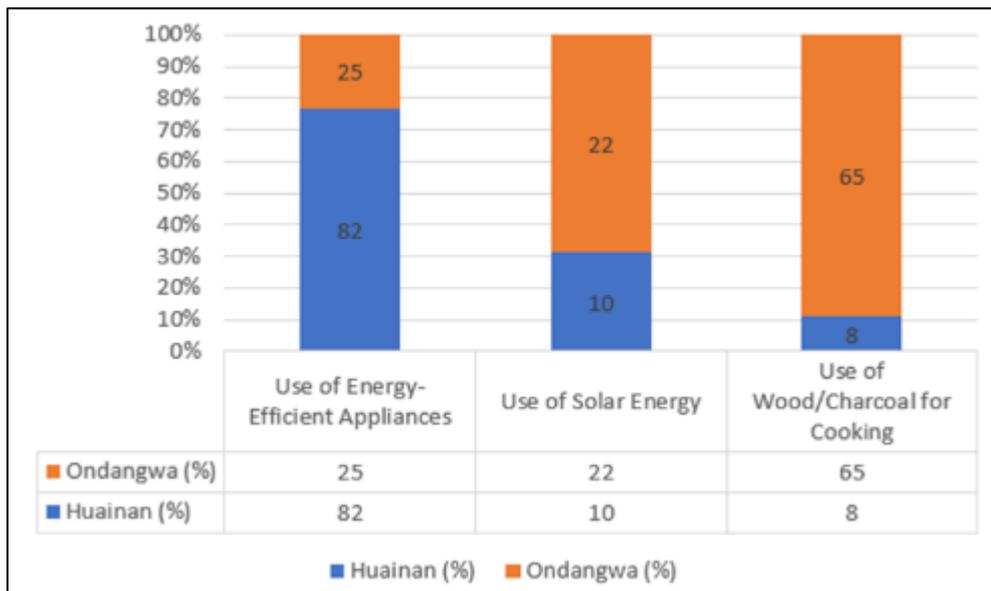


Figure 3 Consumption patterns of Huainan and Ondangwa

4.2. Transportation Habits

Table 4 Transportation

Category	Huainan (%)	Ondangwa (%)
Walk/Bike	25	60
Public Transport Use	35	10
Private Car Use	25	20
Electric Bike Use	40	0

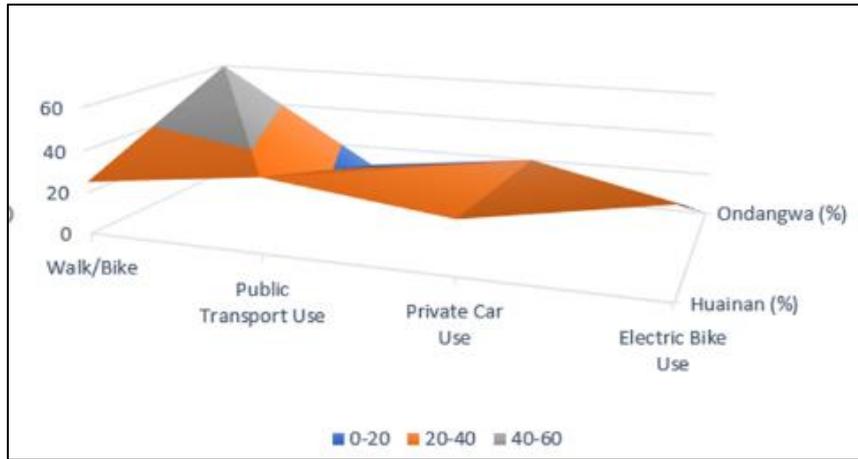


Figure 4 Transportation overview

4.3. Waste Management Practices

Table 5 Waste Management Practices

Category	Huainan (%)	Ondangwa (%)
Regular Waste Sorting	58	18
Access to Smart Recycling Bins	Available	Not Available
Use of Composting	Limited	Widespread
Waste Burning	Rare	Common

4.4. Environmental Awareness and Attitudes

Table 6 Environmental Awareness and Attitudes

Awareness Indicator	Huainan (%)	Ondangwa (%)
Familiar with Low-Carbon Concept	90	45
Participation in Environmental Events	65	30
Exposure to Environmental Campaigns	High	Low

The tables above show how differences in legislation, infrastructure, and social and economic factors can lead to different behaviors. Huainan's high use of energy-efficient appliances and public transportation is directly tied to urban planning that encourages these behaviors and gives people incentives to do so [16]. Ondangwa's population, on the other hand, have developed sustainable behaviors out of need, such as walking, biking, and using solar power, even if they don't get much help from institutions.

5. Conclusion

This study shows that both Huainan and Ondangwa have low-carbon lifestyles, but the reasons for this are very different in each case. Huainan uses an organized, policy-driven strategy backed by economic and technological resources to carry out government-led sustainability projects. Ondangwa, on the other hand, encourages people to be ecologically responsible by using traditional community traditions, cultural norms, and their own resourcefulness, even when there isn't any institutional infrastructure. To make living with less carbon easier, Huainan should focus on getting more people involved, using more renewable energy, and making sure that waste management rules are followed. At the same time, Ondangwa would benefit from investments in basic infrastructure, culturally relevant environmental education, and little improvements to technology that fit with how things are done in the area. To encourage sustainable urban lives in these places, we need to use different techniques that take into account their particular social, economic, and cultural situations.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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