Household Water- Energy- Food access and how that shapes smallholder households' drought coping and adaptation response choices?

Household-level differences in water, energy and food access in drought-prone Namibia

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1. BACKGROUND

- Households of smallholder farmers in Namibia face uneven access to water, energy and food (WEF).
- WEF access is experienced through infrastructure, affordability, reliability, livelihood opportunities and local service conditions.
- National level drought responses may not always address household-level realities and locally specific constraints.

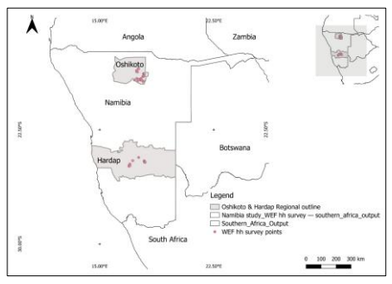
Policy problem: Responses are often planned at national or regional scale with limited focus on household experiences and local challenges.

2. OBJECTIVE

Assess variability in smallholder households' WEF access across selected demographic characteristics in regions with differing aridity levels.

3. METHODS

HOUSEHOLD SURVEY 216 households → **QUANTITATIVE** T-tests • ANOVA → **QUALITATIVE** 23 Key Informant Interviews & 3 workshops → **ANALYTICAL LENS** Water-Energy-Food & Sustainable Livelihoods Framework (capitals)



Oshikoto Region
Semi-arid
Max temp: 32 to 34 °C
Rainfall: 500 to 550 mm (Mendelsohn et al., 2003)

Hardap Region
Arid
Max temp: 33 to 35 ° C
Rainfall: 50 mm in the West and 250mm in other parts (Mendelsohn et al., 2003)

Oshikoto: 109 households of smallholders* | Hardap: 107 households | Total: 216

*farmers operating on relatively small landholdings, relying predominantly on family labour, limited capital and resources and producing crops and/or livestock for household consumption while selling any surplus produce to generate income

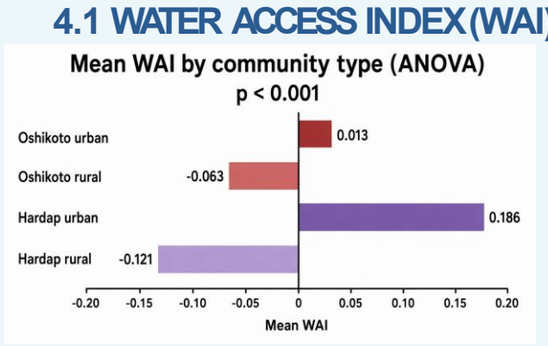
QUALITATIVE COMPONENT

- 54 initial codes → 22 code categories → 8 overarching themes
- Themes - household WEF access, livelihood strategies, resource availability, institutions and governance
- Qualitative evidence was used to explain what the index scores mean in everyday household life

Data validation workshop in Oshikoto urban

4. RESULTS — ANALYSIS OF VARIANCE IN WEF ACCESS BY COMMUNITY TYPE

4.1 WATER ACCESS INDEX (WAI)



Hardap urban had the highest WAI and varied significantly from Hardap rural, Oshikoto rural and Oshikoto urban.

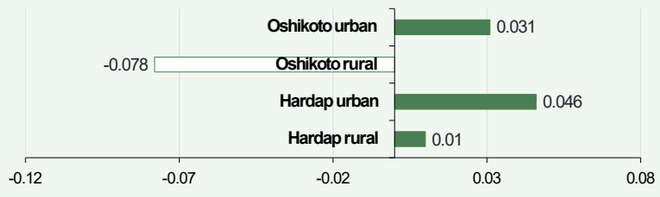
Multiple comparisons test*

- Hardap rural vs Hardap urban — *p < 0.001*
- Oshikoto rural vs Hardap urban — *p < 0.001*
- Hardap urban vs Oshikoto urban — *p = 0.011*

** confirmed significant differences in WAI between selected community types*

Uneven by community type and the highest level of education of household head
No significant difference by sex or region

4.2 ACCESS TO ENERGY INDEX (AECI)



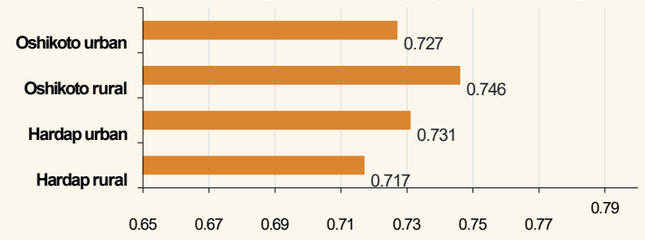
No statistically significant differences in energy access are observed across community types.

Household sources of energy

Households indicated combining electricity, firewood, gas and solar according to affordability, reliability and livelihood needs.

Community type, sex, region and education did not reach p < 0.05
Employment type was associated with AECI (p=0.008)

4.3 FOOD ACCESS (HOUSEHOLD DIETARY DIVERSITY SCORE AS PROXY (HDDS)



A similar aggregate HDDS did not mean identical food baskets across communities.

What the aggregate score hides:

HDDS was broadly similar across communities yet the composition of food access varied.

Oshikoto rural frequently showed stronger access across individual food groups while Oshikoto urban was lower for several groups.

No statistically significant differences across the tested household or spatial characteristics

WEF access was also analysed by sex, education and employment type of household head and region.

5. QUALITATIVE INSIGHTS

What households said makes "access" relevant

WATER
reliability • distance • affordability • saline groundwater

ENERGY
source substitution • affordability • reliability • firewood

FOOD
crops • livestock • gardens • markets • social support

"Everything is connected. When one thing is not there, the others are also affected."
(smallholder farmer- Oshikoto)

6. FROM ACCESS TO HOUSEHOLD CHOICES

WATER access → **ENERGY access** → **FOOD access**

HOUSEHOLD OPTIONS
what can be afforded, combined or substituted

↓

COPING & ADAPTATION CHOICES
livestock • crops • energy choices • external support

The practical question is not only "Is WEF available?" but "What can this household do with what it can access?"

7. FIELD EVIDENCE

Household survey — Oshikoto rural

Water storage + livestock

Solar + irrigation + food

Crafts — alternative sources of income

The photographs provide a context of the household survey taken to provide evidence of measures to ensure household WEF access i.e., households negotiate water, energy, food and livelihood options collectively

8. KEY MESSAGE

Differences in water, energy and food access were associated with community type, education and employment characteristics - shaping the choices available to households.

9. CONCLUSION & IMPLICATIONS

- WEF access was not uniformly patterned across households.
- Water showed the clearest variation by community types.
- Energy differences were concentrated in employment type rather than community types.
- Food access appeared stable at aggregate level (HDDS) but qualitative evidence showed differences in food baskets.
- Drought support should complement regional planning with household- and community-level diagnostics.
- Findings indicate that household WEF access cannot be understood from regional aridity alone. Local community conditions and household characteristics matter.

10. SELECTED REFERENCES

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- Mendelsohn, J., Roberts, C., & Robertson, T. (2003). Atlas of Namibia: A portrait of the land and its people. David Philip Publishers.

Source: Household survey and qualitative field data, Hardap and Oshikoto. Index means are based on valid responses.