Energy services and life satisfaction: a study on households in two Mexican communities

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Background of energy and well-being research

Historical approaches

- Human development and energy use (19th cent – Spencer 1880, White 1949)

Expansion of empirical work (20^{th}/21^{st} cent)

- Economic indices as well-being measures (60s～ Schurr 1960, Naseri 2000)
- Alternative indices of well-being (70s～Mazur 1974, 2011, Rosa 1988, Knight 2011)
- Further connections: poverty, externalities, public opinion, behavioural aspects, etc. (80's～ Boardman 1991, Jackson 2005, etc.)
- **Linking concepts between ends (Modi 2006, Sovacool 2011, Cravioto 2014)**

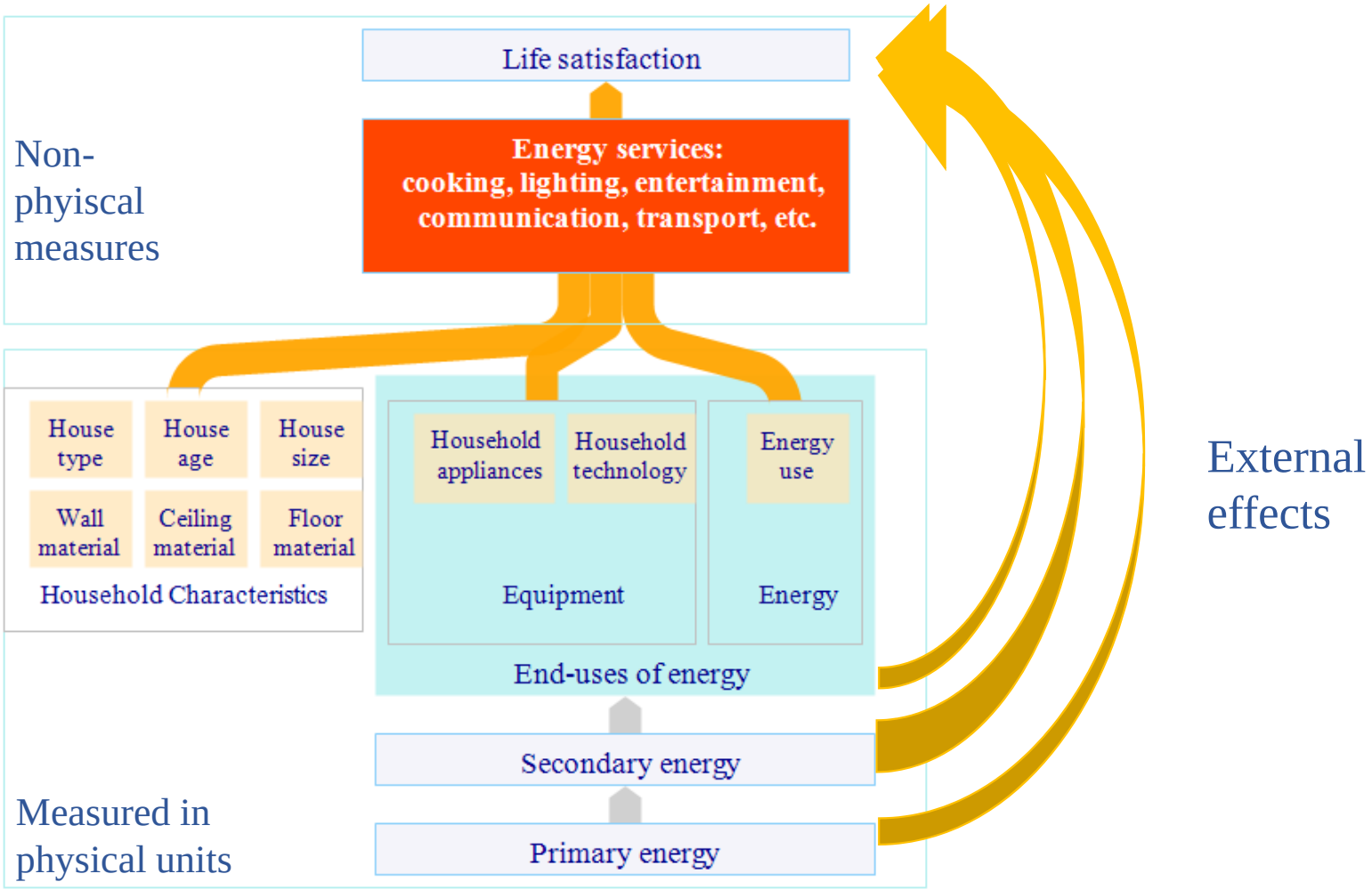
Contributions: macroscale theory, disciplinary analyses

Research necessity:

bond using linking concepts, holistic perspectives, context differences

How energy use exactly contributes to higher well-being levels?

Energy consumption and life satisfaction diagram



Literature on household and energy services

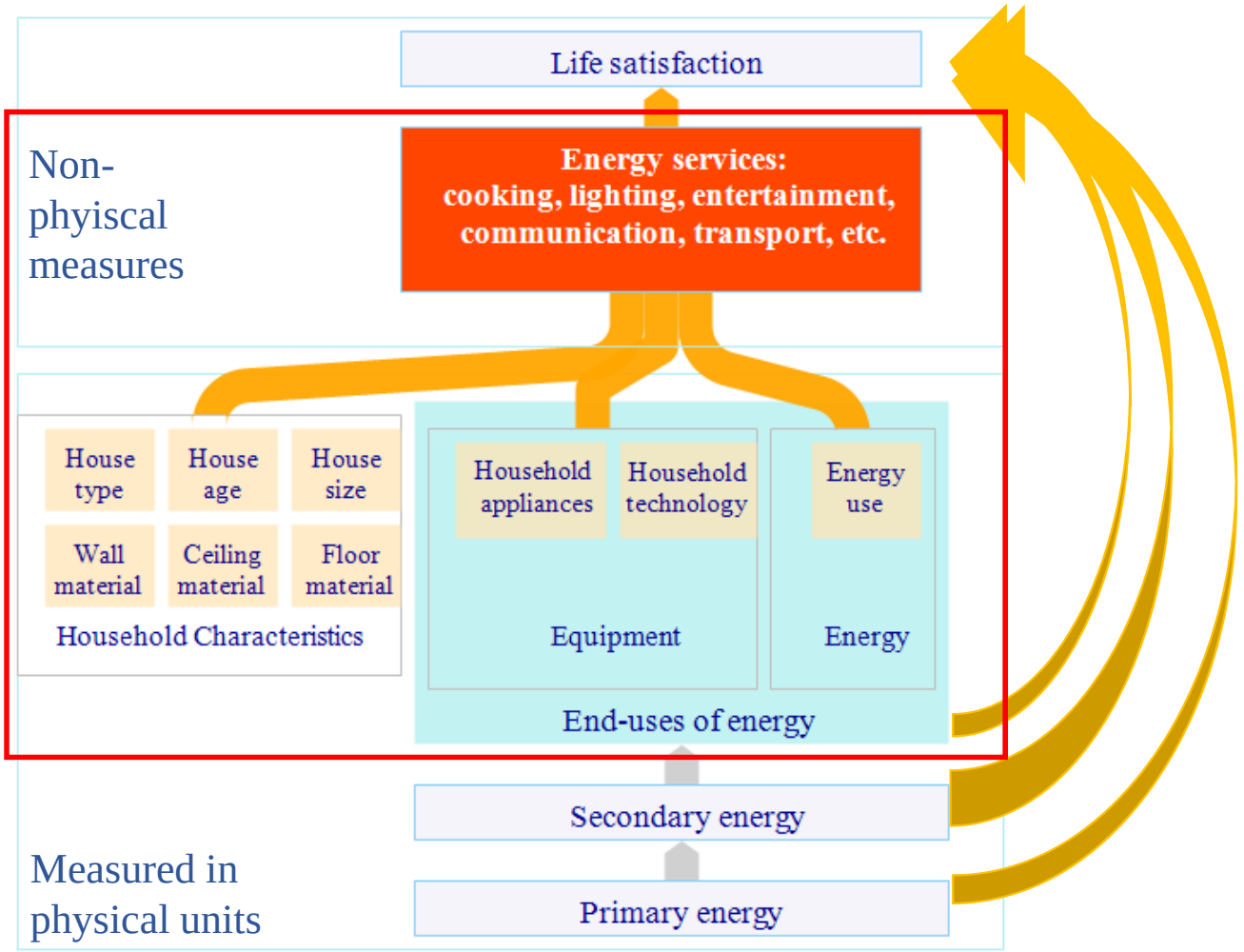
Household-scale descriptions of energy-well-being link

- Fewer in literature, isolating energy from other elements is difficult

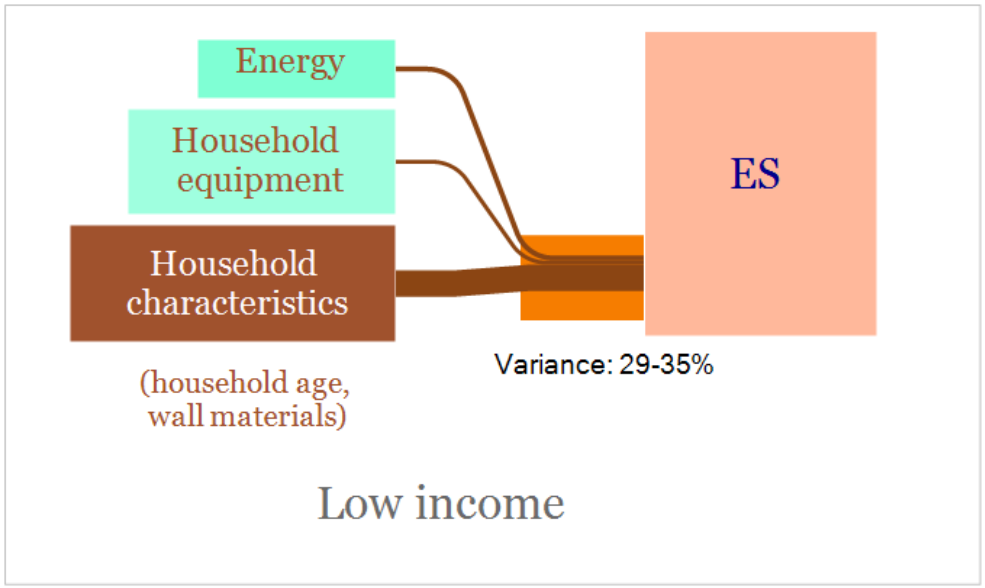
Energy services (ES): a novel approach

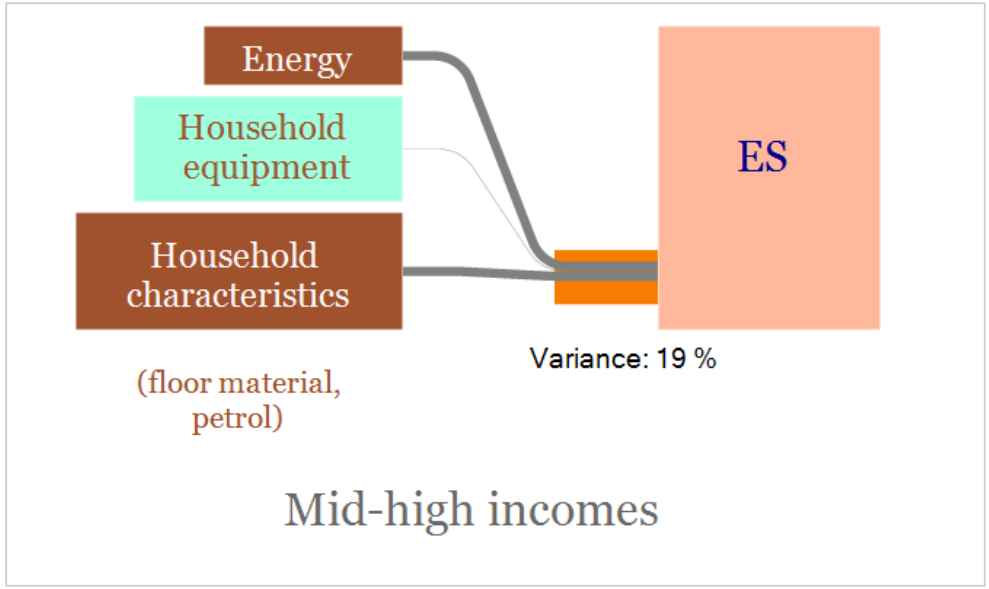
- Previous analyses take ES for end-uses (physical/economical units)
- In reality ES are applications of end-uses of energy (at households) + other elements
- ES can come closer to be human well-being surrogates of energy consumption (using an alternative measurement)

Energy consumption and life satisfaction diagram



Energy services and material predictors*





- Household features can largely predict ES satisfaction levels
- Energy is relevant from mid incomes on

*Based on Cravioto et al, 2014

Theory: energy services ladder* / hypothesis

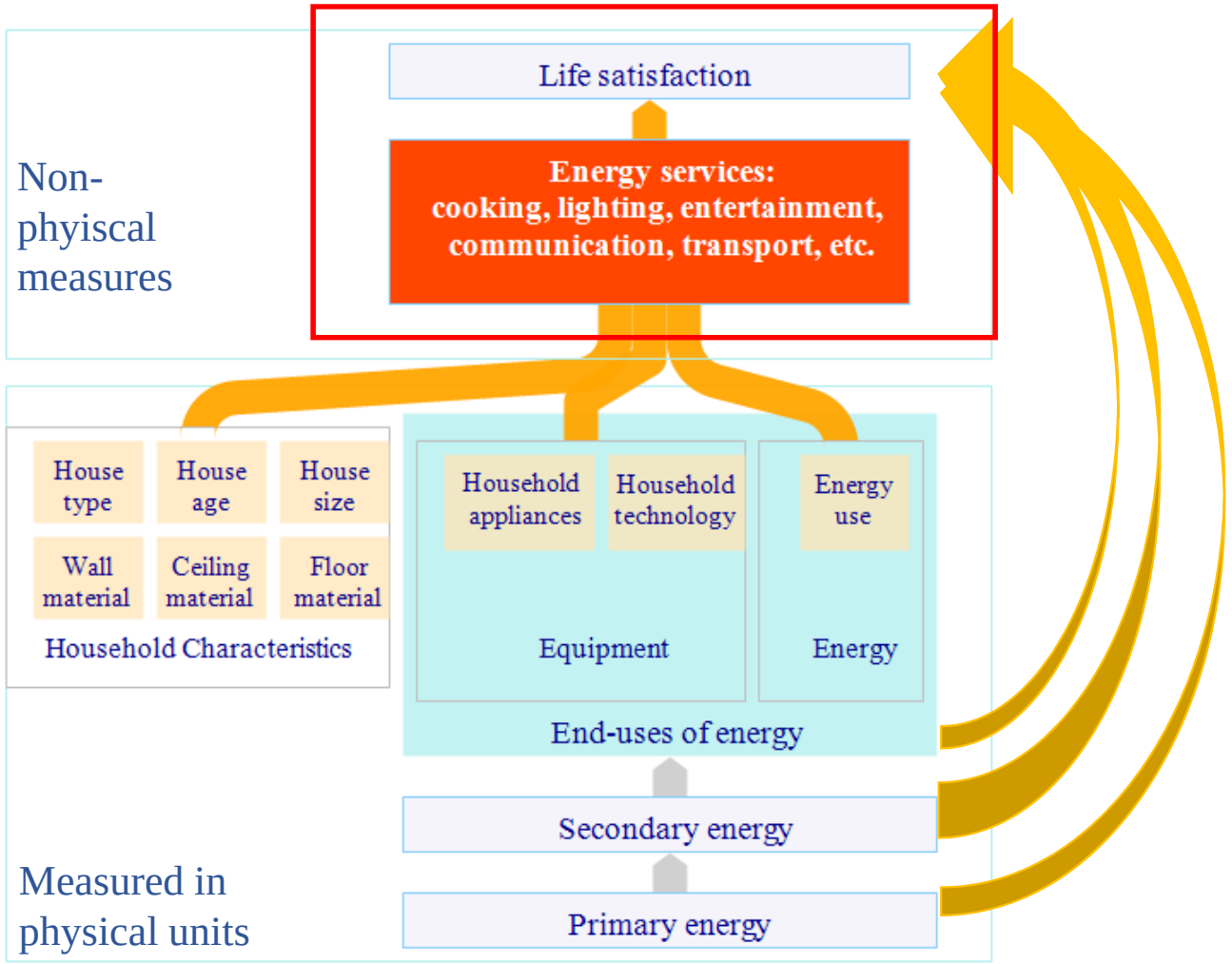
	Income level		
	Low	Med	High
	< $10k	$10-20k	>$20k
Fuels utilised	biomass, charcoal, paraffin, kerosene, petrol, LPG, gas, electricity	electricity, natural gas, LPG, kerosene, petrol	electricity, natural gas, petrol
Energy services in household	**cooking, lighting, entertainment, communication, transport**	**all previous +** heating-cooling space, advanced telecom, automatic clothes washing, etc.	**all previous + luxury related** (heated pool, toilet washlet & heated, TV sets in kitchens, etc.)
Driving force behind energy use	subsistence	convenience, comfort, cleanliness	conspicuous consumption, social signalling
How meaningful are ES (for LS levels)?	**More**	**Less**	**lesser**

*Sovacool, 2011

Purpose

- Measure six ES as real well-being surrogates
- Analyse relationship with overall life satisfaction

Energy consumption and life satisfaction diagram



Survey collection

Region selection

Two sites in the Mexican central plateau

- Similar language, traditions, religion, climate (temperate)
- Different socio-economic levels.

Cuauhtémoc [15,636 dls/year]

Zoquitlán [2,208 dls/year]

Collection and sample

Survey in randomly selected households.

98 questionnaires: 58 from Cuauhtémoc and 40 from Zoquitlán

Method: Survey

Questionnaire

- Well-being measure (R. Veenhoven):

Taking everything into account, how satisfied or dissatisfied are you currently with your life as a whole?

1 ——— 2 ——— 3 ——— 4 ——— 5

Dissatisfied Satisfied

- Six ES : illumination, temperature regulation, food

In a five-point scale, rate how satisfied or dissatisfied you are currently with the following ES at home?
(1 being very dissatisfied and 5 very satisfied) _____

Analysis approach

Description by region

- Statistics/distributions

ES as a single construct

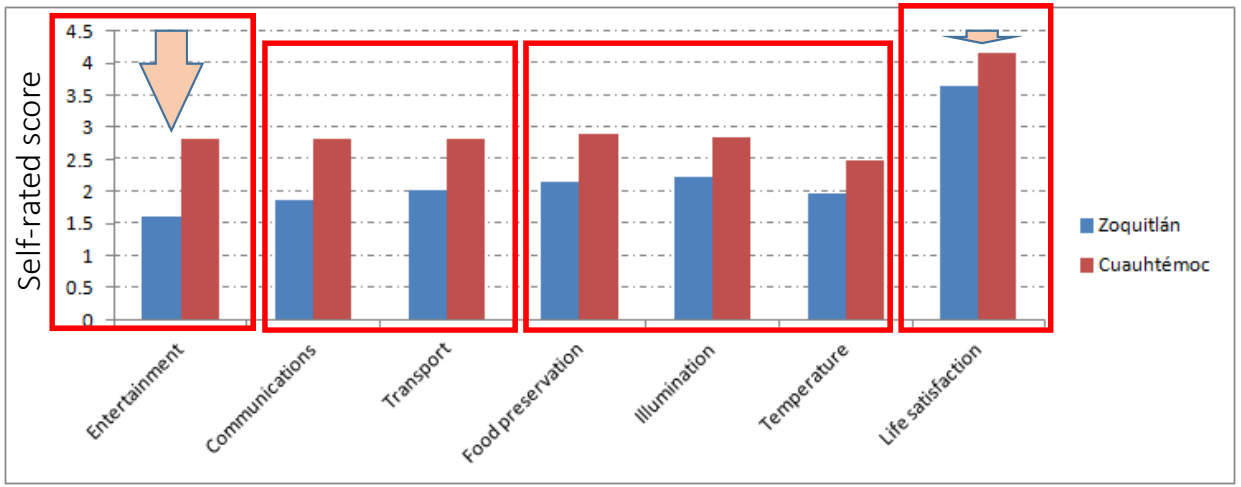
- Principal Component Analysis (PCA)

ES-LS association

- Correlations
  - Spearman Rho, Kendall Tau, Gamma (ordinal)

Results : ES and LS sample description (1)

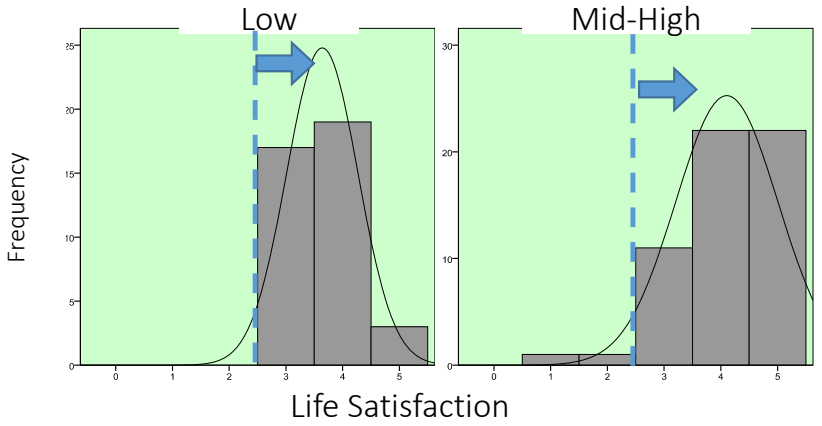
- Better general conditions of households at Cuauhtémoc reflected more clearly in some ES.
  - Entertainment (> 1 point)
  - Transportation and communications (∼ 0.8 points)
  - Food preservation, illumination and temperature reg. (< 0.5 points)



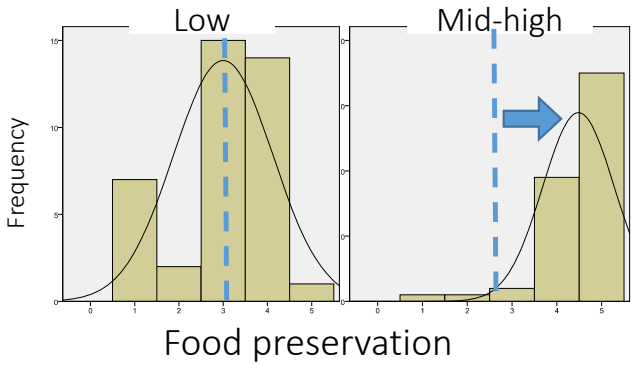
- LS results more comparable (< 0.4 points)

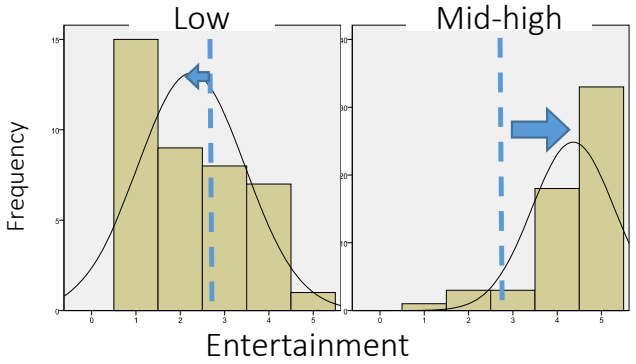
Results : ES and LS data description (2)

- LS: left-skewed at any income.

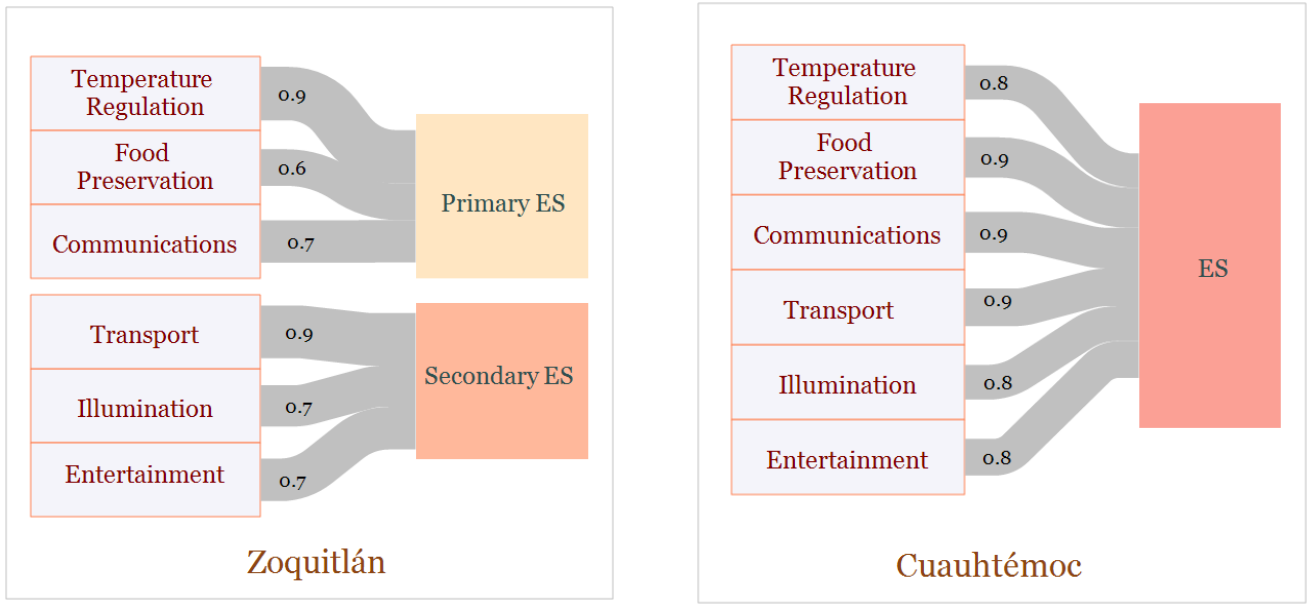


- ES: normal or right-skewed low income
  left-skewed at mid-higher incomes.





Results: simplification of ES into single constructs (PCA)



*Components significant to the 95% C.I. from a parallel analysis

ES condensed into a single measure observed differences:

- At lower incomes (Zoquitlán), **two components** / at middle incomes (Cuauhtémoc), **one**.

Discussion: Preference for improving ES shifts from hierarchical to homogeneous?

Results: ES-LS associations

Low incomes:

- Less ES relevant to enhance LS levels

Once income increase

- Stronger linkage between ES and LS

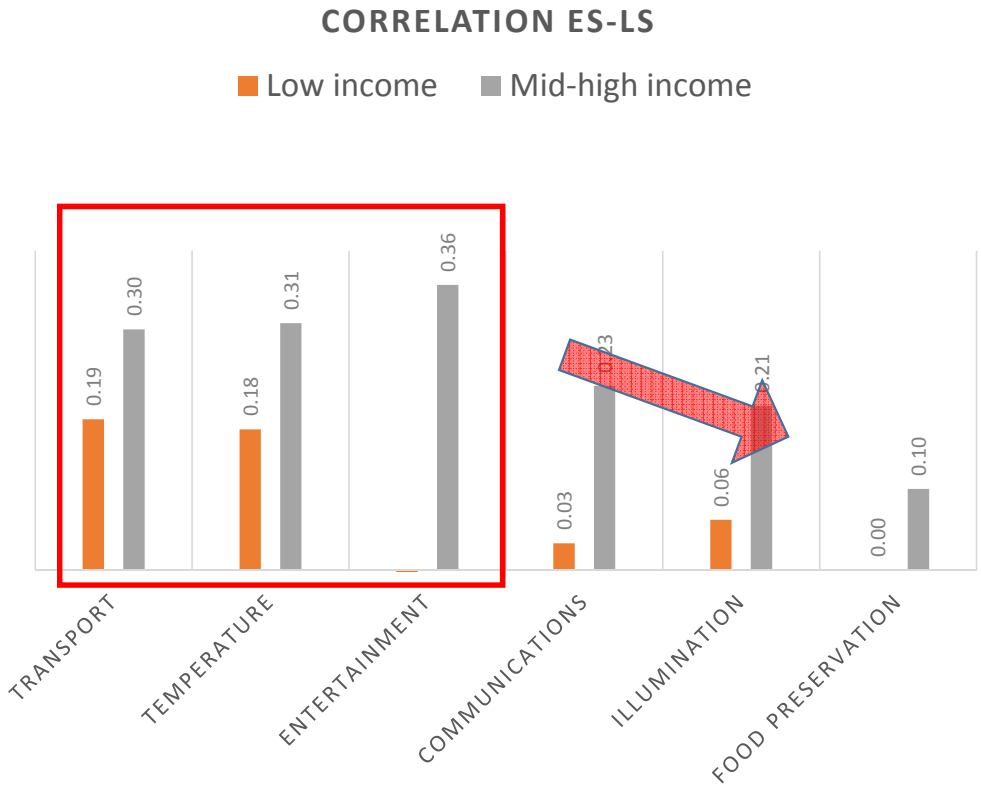
Most important ES for LS levels:

- Transport and temperature regulation
- Entertainment (relevant once income increase)

Discussion:

More concern is placed on households features as income increase?

(e.g. entertainment taking place inside households in mid-incomes, in contrast to low incomes where it might be done outside).



Summary of main findings

Theory on energy services:

- Energy services at lower incomes do not bridge energy use and life satisfaction
- Only from mid incomes on, energy services become more important
- As income increase ES shift from two “hierarchical” groups to a single homogeneous one

Implications on policy (to enhance well-being levels):

- Low incomes: improve transportation services and ways to preserve temperature in households
- Mid incomes: focus more on other energy services (more important for well-being)

Further research

Improve detail of findings

- Further income levels
- Distinguish beween household types
- Detailed exploration of rural-urban contexts
- Intercultural differences

Energy services and methods

- Further set of ES
- Expand on direct vs indirect ES
- Path analyses and SEM

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Thank you
for your attention

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