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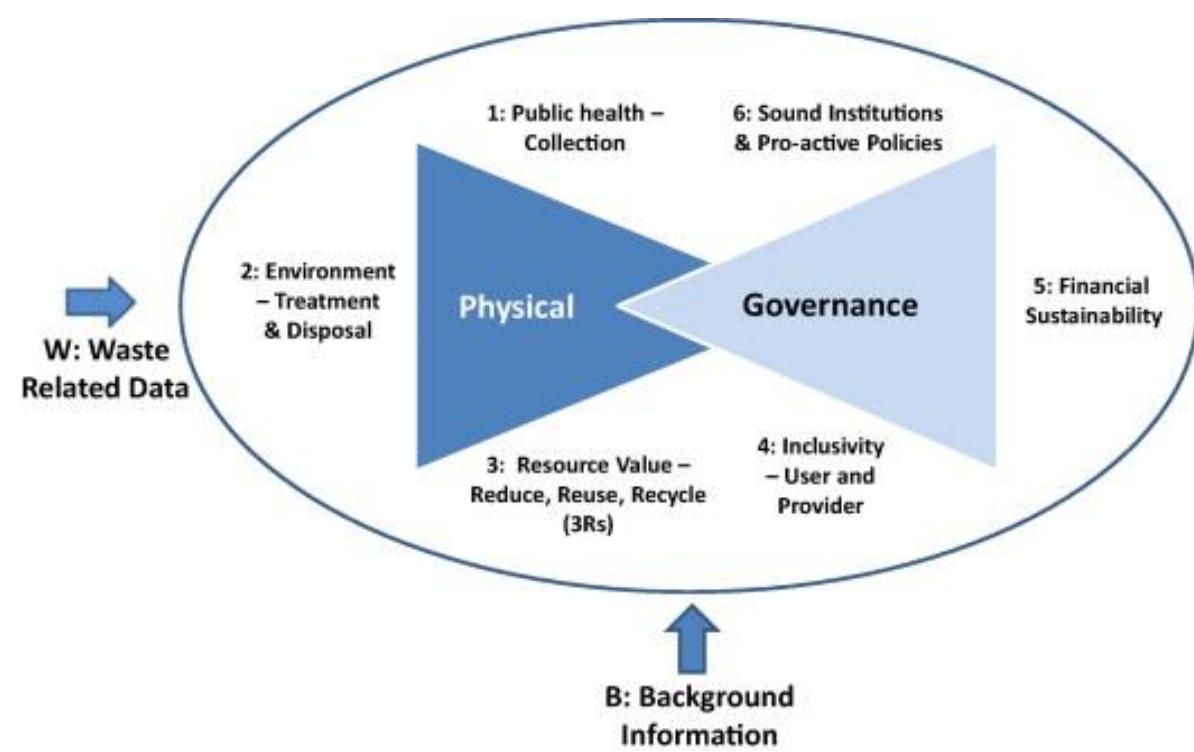
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1. Rationale

- Rapid economic growth, urbanization and continuing population growth are causing the increase of waste generation levels (1.3 billion tons in 2012 to increase to 2.2 billion tons by 2025).
- Concerns for public health and rising environmental issues; affects the image of the city (tourism, businesses, investments...).

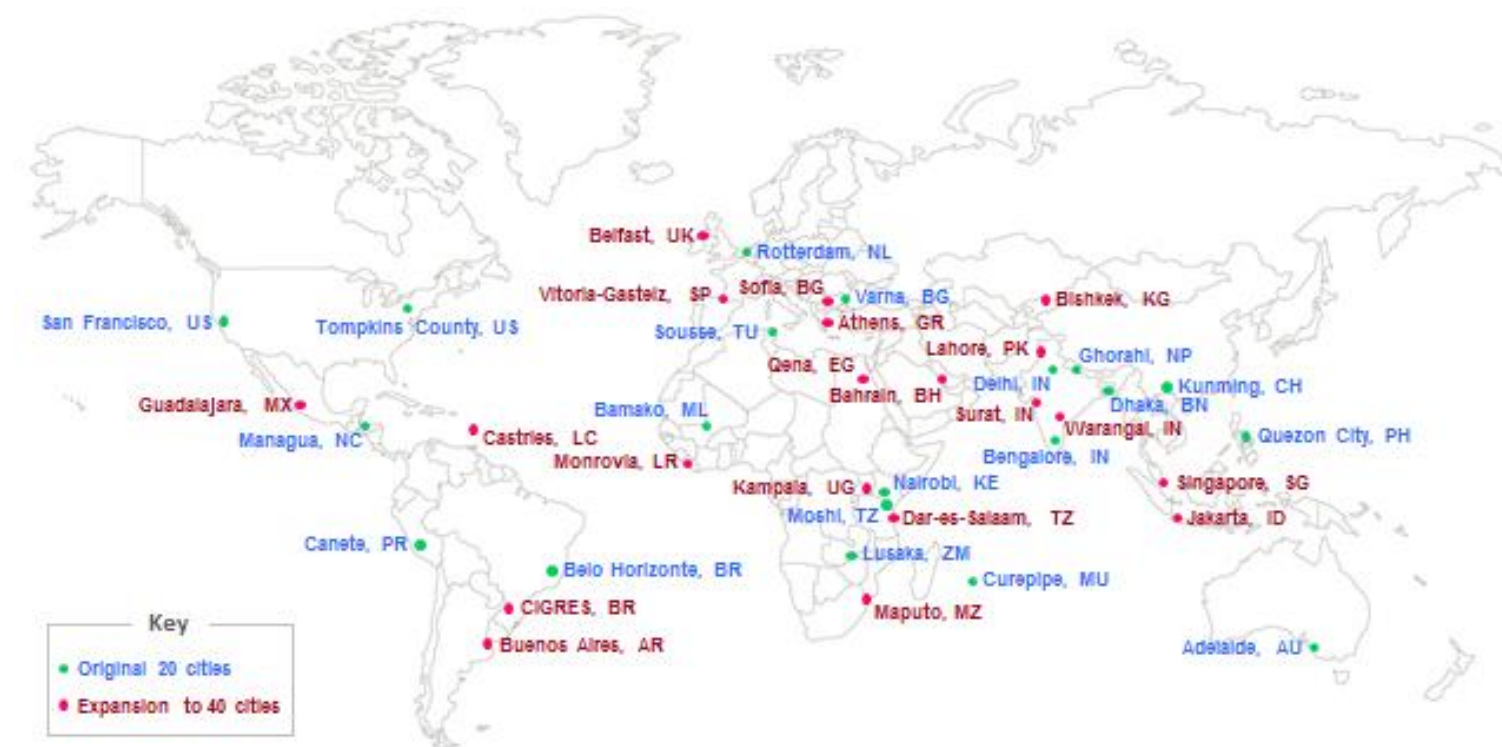
"If you don't measure it, you can't manage it"

2. Background



- 12 indicators; 4 quantitative and 8 composite qualitative (waste collection, waste treatment and disposal, resource management, inclusivity, financial sustainability, sound institutions).
- Supporting information: background information on the city and key waste-related data.
- A traffic light colour coding system to quickly identify the strengths and weaknesses of the system.

- A holistic approach (socio-cultural, environmental, economic and technical factors).
- Suits both developed and developing countries.
- Addresses the historical lack of reliable and consistent data.
- Helps decision-making, monitoring changes.



3. Approach

- Compile, refine and update the database extended to 40 cities.
- Source relevant independent variables (GDP per capita, SPI, EPI, cultural cluster, climate...).
- Perform descriptive analysis and basic statistics.
- Review existing literature and build for the first time multiple regression models.

Cautions with the results

- Sourcing at municipal level and covering a maximum of the database are often incompatible.
- The existing theory on SWM is scarce and provides mixed results.
- More observations are required to confirm the multiple regression models.
- Hypothesis to explain the correlations found were raised but others could be possible.

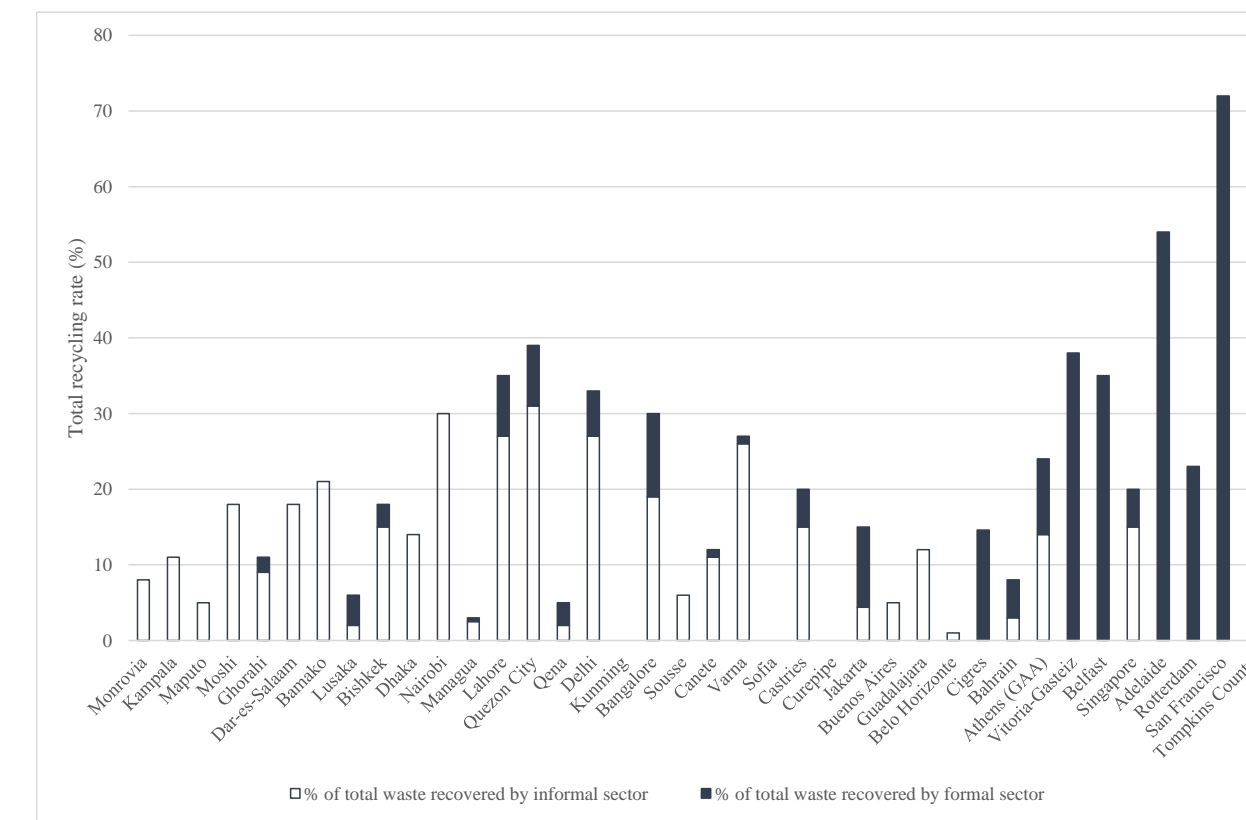
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Scheinberg, A., Spies, S., Simpson, M. H. & Mol, A. P. J. (2011) Assessing urban recycling in low- and middle-income countries: Building on modernised mixtures. *Habitat International*. 35 (2), 188-198.

Wilson, D. C., Rodic, L., Cowing, M. J., Velis, C. A., Whiteman, A. D., Scheinberg, A., Vilches, R., Masterson, D., Stretz, J. & Oelz, B. (2015) 'Wasteaware' benchmark indicators for integrated sustainable waste management in cities. *Waste Management*. 35, 329-342.

The role of the informal sector

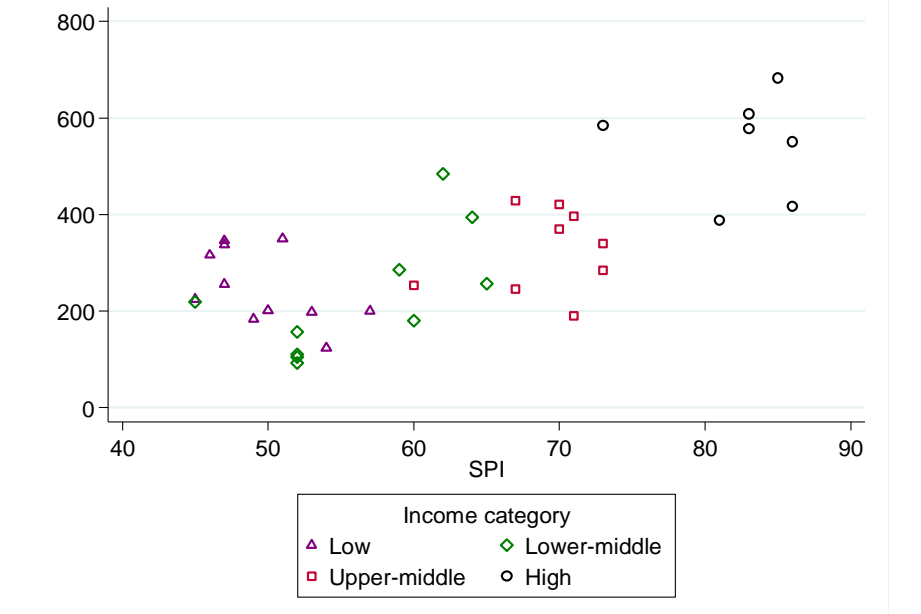


"The informal solid waste sector refers to individuals or enterprises who are involved in recycling and waste management activities but are not sponsored, financed, recognised or allowed by the formal solid waste authorities, or who operate in violation of or in competition with formal authorities" (Scheinberg et al., 2011).

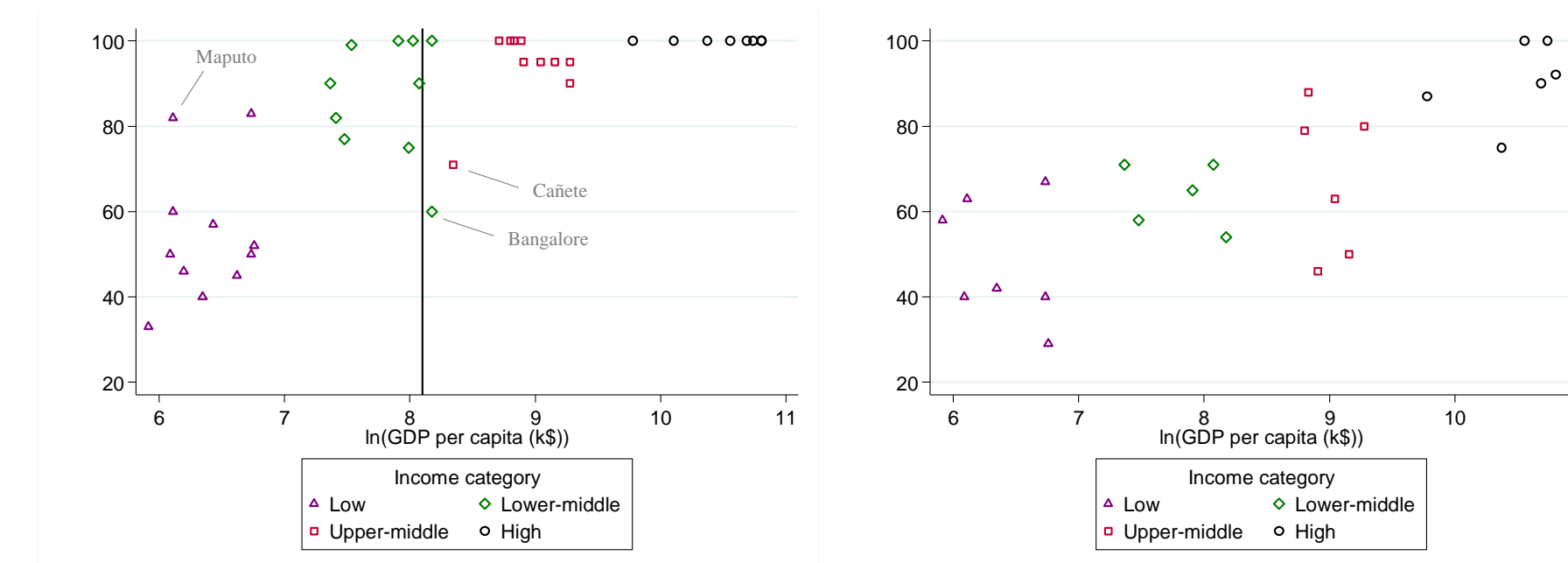
- Key role in developing countries; good representativeness of 'effective recycling'.
- What higher rates could be achieved if the IRS was fully integrated?

Waste generation per capita

- There seems to be a linear correlation between waste per capita and the level of socio-economic development ($R^2 = 0.51$).
- Could it follow the hypothesis of the Waste Kuznets Curve (WKC) with a delinking for the very-high category of social progress?



Collection service



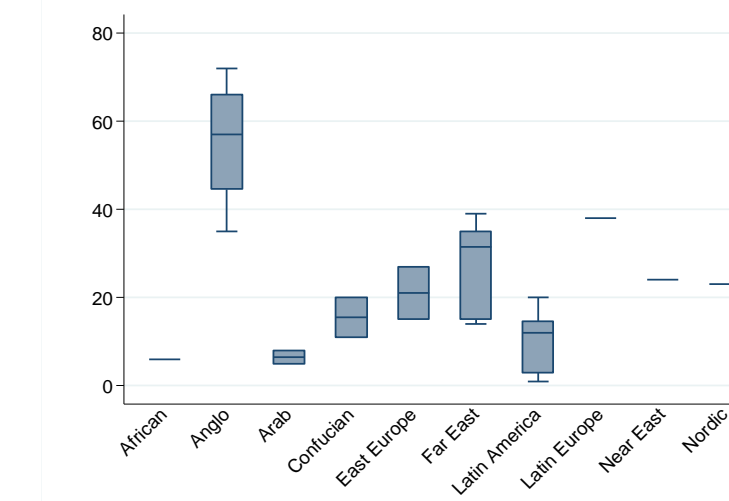
Waste collection coverage seems to follow a piecewise linear pattern ($R^2 = 0.74$ on the linear part). The threshold is estimated at about 3,300 k\$ of GDP per capita.

Its related 'qualitative' indicator goes deeper in the analysis and has a good insight on assessing the performance of the collection service, showing a good linear correlation ($R^2 = 0.57$).

Multiple model for recycling rate

Source	SS	df	MS	Number of obs = 36		
Model	3862.29885	2	1931.14943	F(2, 33) = 11.51		
Residual	5538.54003	33	167.834546	Prob > F = 0.0002		
Total	9400.83888	35	268.595397	R-squared = 0.4108		
				Adj R-squared = 0.3751		
				Root MSE = 12.955		

	rec_rate	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnGDPpc		5.39298	1.348211	4.00	0.000	2.650023 8.135937
lat_am		-17.37222	5.504434	-3.16	0.003	-28.57107 -6.173363
_cons		-20.22708	11.34046	-1.78	0.084	-43.29942 2.845254



Correlation ≠ Causality

- Positively correlated to the income level but significantly lower in Latin American cities.
- Does the municipality focus on collection and disposal standards instead of the parts of the system for which they are not 'responsible'?
- Is it a transition period on 'material scarcity'?
- Is it a cultural effect?

Acknowledgments

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