

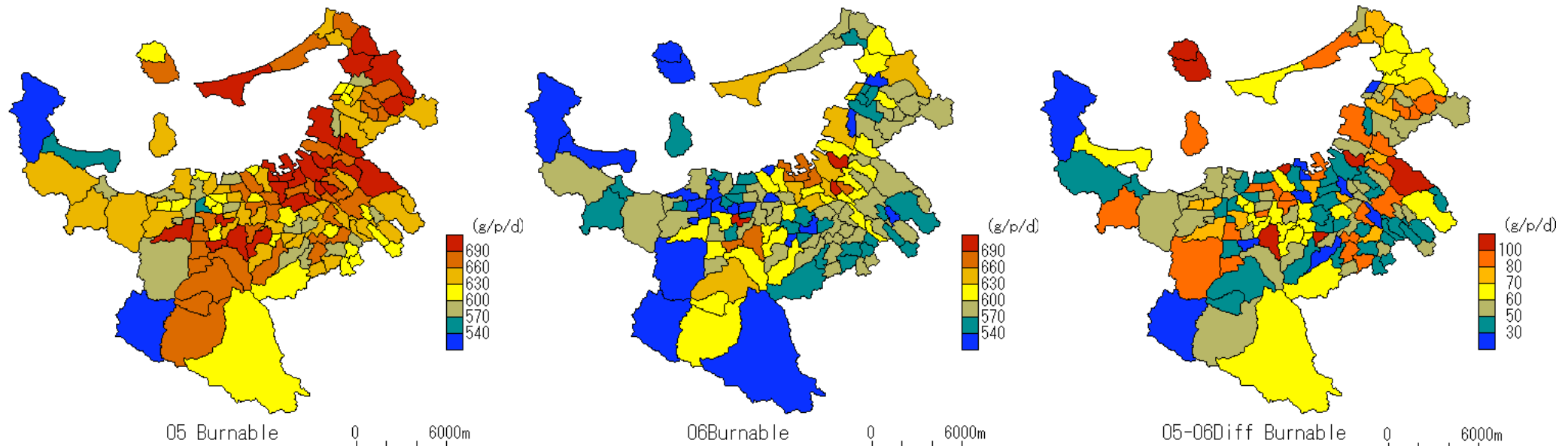
An Assessment of Variable Charging Scheme as a Means to Waste Minimisation

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By analysing the data at the **neighbourhood level**, this research aims to take a closer look into the factors affecting waste arisings and the effect of variable charging ("pay as you throw") scheme.

* Municipality is **not** the ideal unit to analyse the effect of socio-economic factors on waste arisings - a city consists of many districts each with different characteristics, and using the average will hide the effects.

* Regarding Variable Charging, it is important to know to what kind of areas it is most effective, and what side-effects are taking place in lieu of the observed decrease in waste. Small unit analyses can be useful for this.



Data source: Fukuoka City, Japan (pop 1.5mil)

Data unit: Primary school district (pop.ca.10000 each)

Data period: Apr-Jul 2005 and 06 Collection System: burnable/ non-burnable/ bottles/ wastepaper. (wastepaper also collected by private companies)

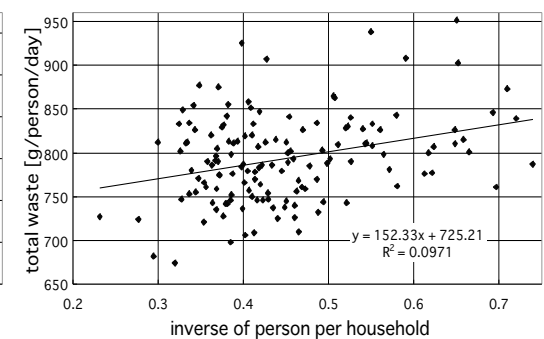
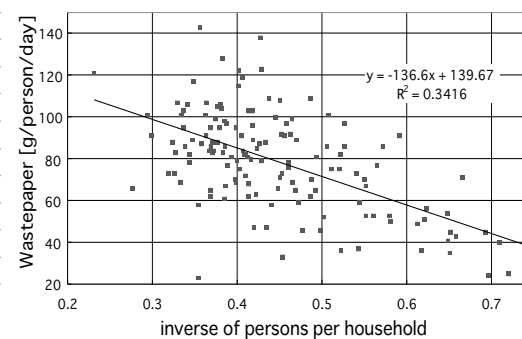
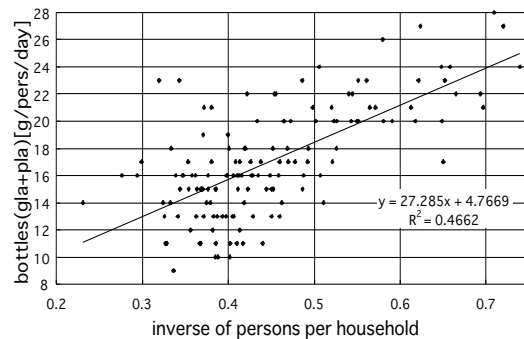
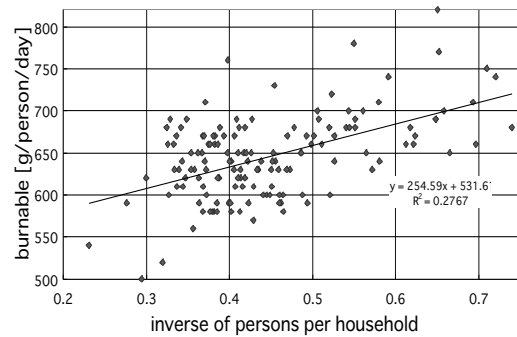
VC introduced Oct.2005: designated bag system, ¥1/litre, (¥0.5/l bottles, ¥0 wastepaper).

* 2005 average arisings 645 g/person/day, 2006: 583 g/person/day.

* In average, a decrease of 62 g was observed in the burnable fraction after the introduction of variable charging.

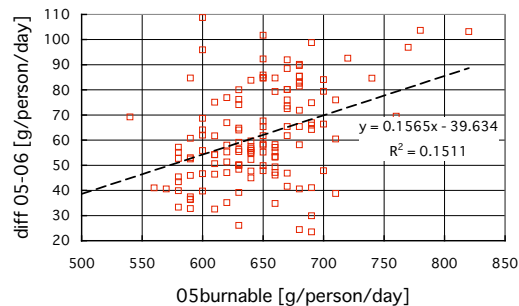
* There is a considerable range in arisings (500-820 g/p/d: 2005) as well as pre/post-VC difference (-264+38 g/p/d)

Analysis of arisings



Household size (person per household) showed significant correlations: Smaller household areas generate more **burnable waste** and **bottles** (recyclable) per person, whereas larger household generate more **wastepaper**. Various other socio-economic factors have been tried out (single and multiple regression), but did not show significant correlation (**size of housing, %of detached housing, business premises per population, house ownership, unemployment rate**).

Analysis of pre/post-Variable Charging



Regression analyses with the factors mentioned above were carried out for the difference in the amount of burnable waste collected pre-and post-introduction of VC. However, there was no marked correlation, except that **districts that had a higher arisings tend to have a higher decrease**.

There is evidence that the amount collected as wastepaper (no charging) has increased. The increase in wastepaper may offset the decrease in "burnables". Hence VC may not have achieved "Minimisation", which requires a reduction in the net amount of waste, including recyclables.

Conclusion

It appears that the introduction of **VC** has encouraged residents to **segregate recyclables more rigorously** than before. However, when it comes to genuine **minimisation, it is not certain**. This should become clearer when the 2006 data on wastepaper collection becomes available, and also with a careful estimation on the tonnages for private sector recycling. It is probable that reduction in the non-recyclable fraction be offset with the increase in non- (or less) charged recyclable fraction.

Without a supply-side policy, from the viewpoint of the household, the same amount of items becomes unnecessary and directed to disposal whether or not under VC. It is a matter of whether disposing it as mixed waste, or as separated recyclables. **Upstream policies** such as banning, restricting or taxing single-use containers would **probably be more effective in minimising the overall arisings**.

It is shown here that there is a **large variance in the effect of VC** among school districts. However, we are not yet able to identify what the influential factors for the differences are. **Identifying the factors** and establishing a numerical model on the effect of VC remains to be an important task to worked on, as this will provide important clues on assessing how and under what conditions VC is effective.