Air pollution and Health in urban Beijing

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GLOBAL IQ
INPACT QUANTIFICATION OF GLOBAL CHANGES

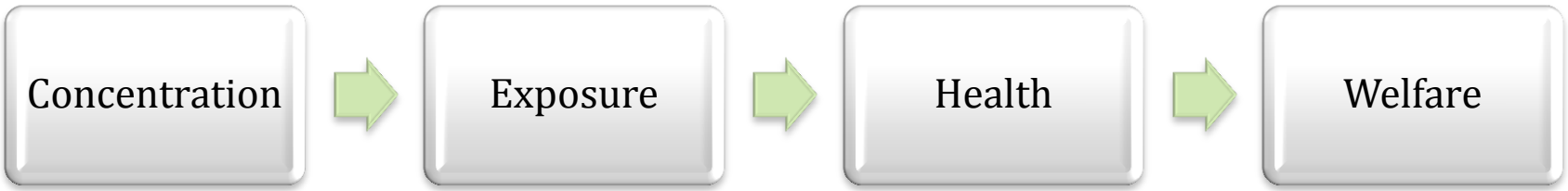
Global Impact Quantification (IQ)

EUROPEAN COMMISSION
European Research Area

SEVENTH FRAMEWORK PROGRAMME

Scope of the project

- Ancillary benefits of GHG reduction: health.
- Heterogeneous across countries, so test in a developing nation.
- From exposure to health outcomes, many factors affect vulnerability



Household Survey

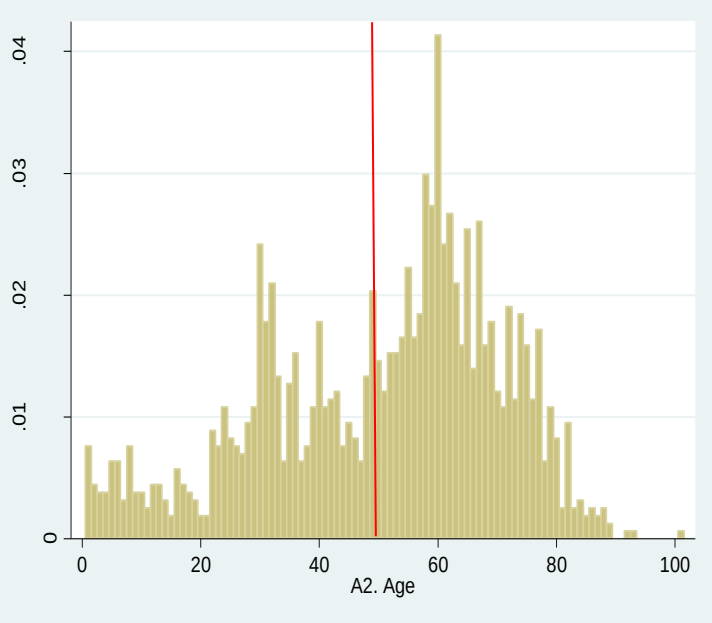
1. Sampling
2. Questionnaire
3. Some summary statistics

Sample

- 3 Districts, 556 households, 1583 individuals.
- Sampling by Probability Proportional to Size (PPS) at District and Street level and Random at lower levels
- Quite representative in terms of gender, age and income.

districts	Survey		Stastical Yearbook	
	Total household income	2 years ago	Total household income	2 years ago
dongcheng	84135	91200	----	85491
haidian	147756	112246	----	109078
chaoyang	117804	105368	----	93256
average	119931	105673		

	survey		6th national census	
	female（%）	male（%）	female（%）	male（%）
dongcheng	52.7	47.4	50.6	49.4
haidian	51.1	48.9	48.3	51.7
chaoyang	52.4	47.6	48.5	51.5



Questionnaire

1. Personal Characteristics

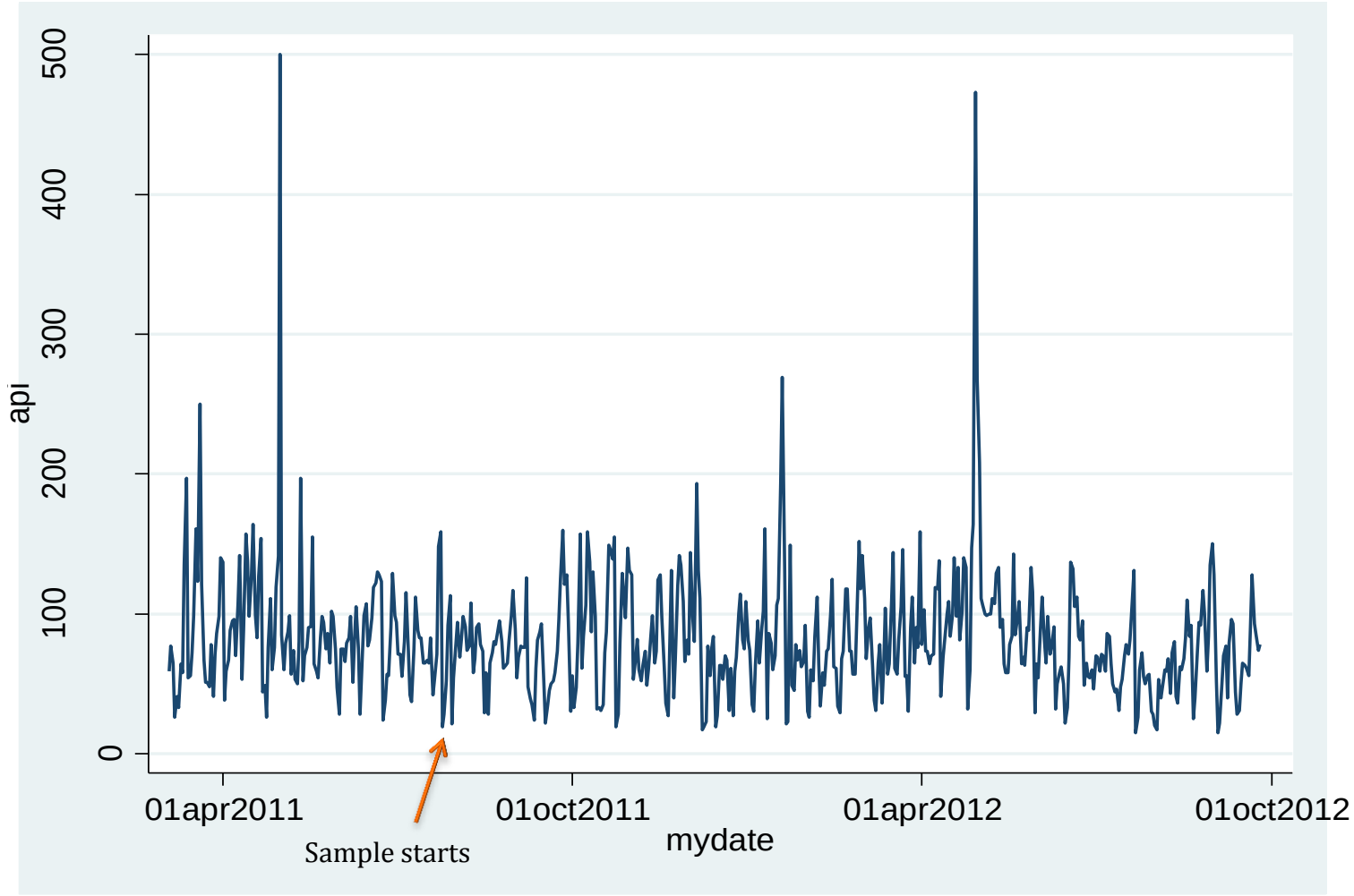
2. Insurance and cost of illness

3. Health: Sympthoms, Acute and Chronic airborne events
   - Compared to past 2 and 5 years
   - Level of pain caused

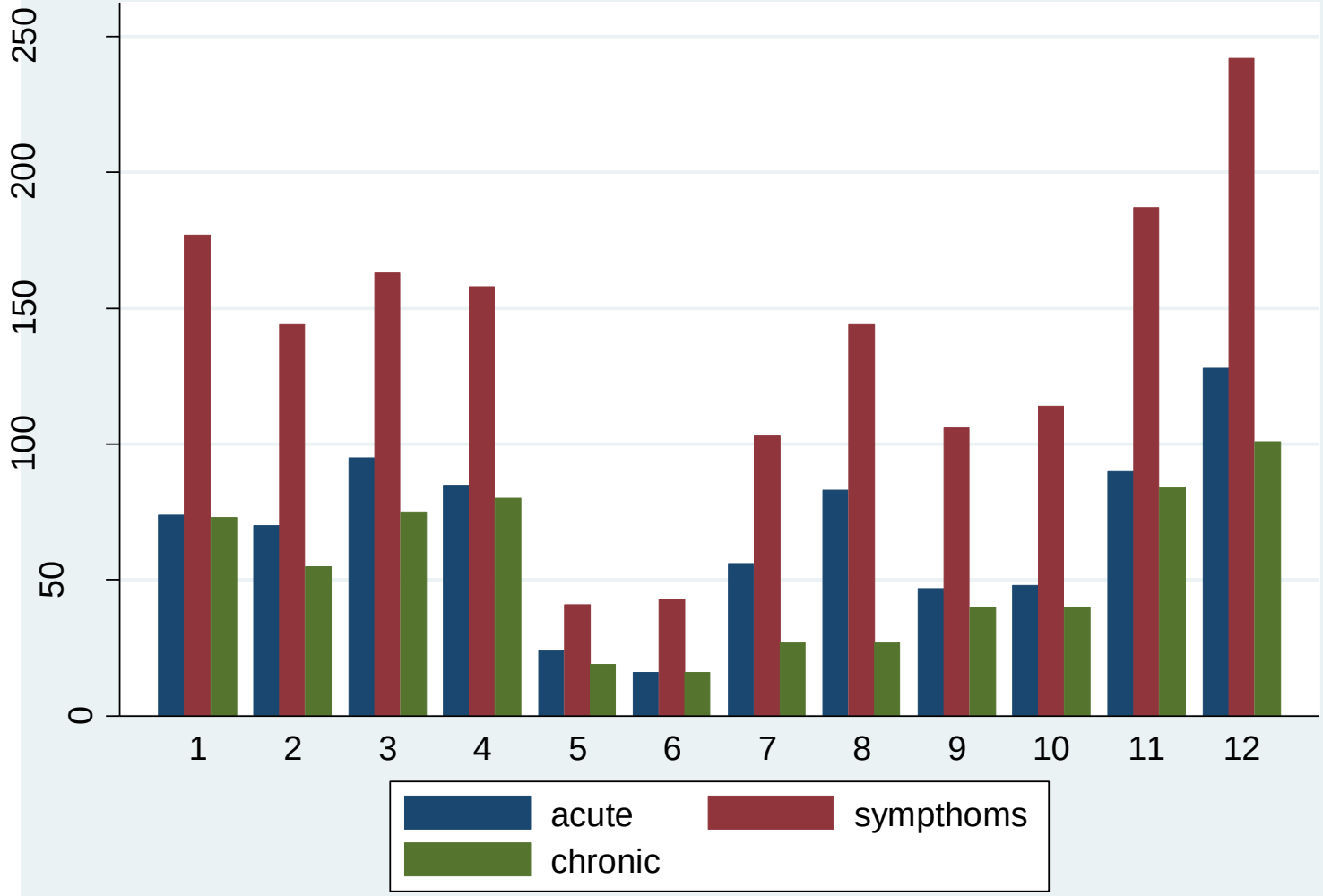
Questionnaire

4. Exposure (transport and time-use)
5. Access to information
6. Averting behaviour

Air pollution in Beijing



Health episodes



Empirical model

$$Health_{it} = f(exposure_{it}, income_i\ \boldsymbol{behaviour}_{it}, controls_i)$$

Endogeneity and omitted variables problem

$$Behaviour_{it} = f(exposure_{it}, income_i, controls_i, \boldsymbol{info\ shock_{it}}, \boldsymbol{health_{it-1}})$$

- Cost of Illness
- Explaining averting behaviour

Next steps

- Estimate the DRF
- Quantile effects
- Extend it to get policy relevant costs – but we would need a baseline mortality/morbidity

Thank you!

District	total(person)	total(household)	community	sample size(person)	sample size(households)
haidian	628	215	fuyi	44	16
			dongnan	61	21
			hualian	40	16
			hejianlou	63	25
			zefengyuan	72	21
			huangzhuang	45	18
			taiyangyuan	78	25
			dongyingfang	88	27
			xiaonanzhuang	68	23
			daoxiangyuannan	63	22
dongcheng	455	156	jingtai	46	16
			taoyanglu	105	32
			xigexinli	78	30
			jinbaojiebei	117	40
			zhaojialou	103	36
chaoyang	500	185	yuhuili	36	13
			xibahexili	57	22
			guangximenbeili	51	20
			balizhuangnanli	48	18
			chenguangjiayuan	58	23
			shilipunanli	26	10
			liulitunbeili	55	19
			xibahenanli	46	17
			huizhongli2	81	27
			huizhongbeili1	54	19
Total	1583	556		1583	556

Sampling stages

$$p_0 * \frac{[N_H]_{D1}}{[N_H]_{TOT}} * p_1 * \frac{[[N_H]_{S1}]_{D1}}{[N_H]_{D1}} * \frac{p_2}{[[N_{C1}]_{S1}]_{D1}} * \frac{x}{[[[N_H]_{C1}]_{S1}]_{D1}} = c$$

W0 - Choice of district (PPS)	W1 - Choice of street (PPS)	W2 - Choice of Community (Random)	Choice of household (Random)

We have a number of equations for each district, street and community. We set x to a reasonable number in the first one, and solve for all other equations so that c is constant.