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Scenario Analysis about LC-GHG Emission of Household Food Consumption Considering Household Characteristics

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Background

- LC-GHGs from food consumption

→One of major cause of the emission related daily living

- Future trend of emission in Japan seems to be affected by multiple factors: economic condition, population decrease,

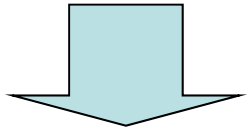
  increase of single household, population aging….
- Modeling and estimating future trend is important for life cycle management of food consumption

Objectives

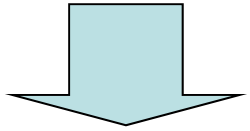
- Estimating future food consumption by household and CO_2 emission considering future economic and demographic changes

Methodology

Combining household expenditure survey and future economic/demographic scenario

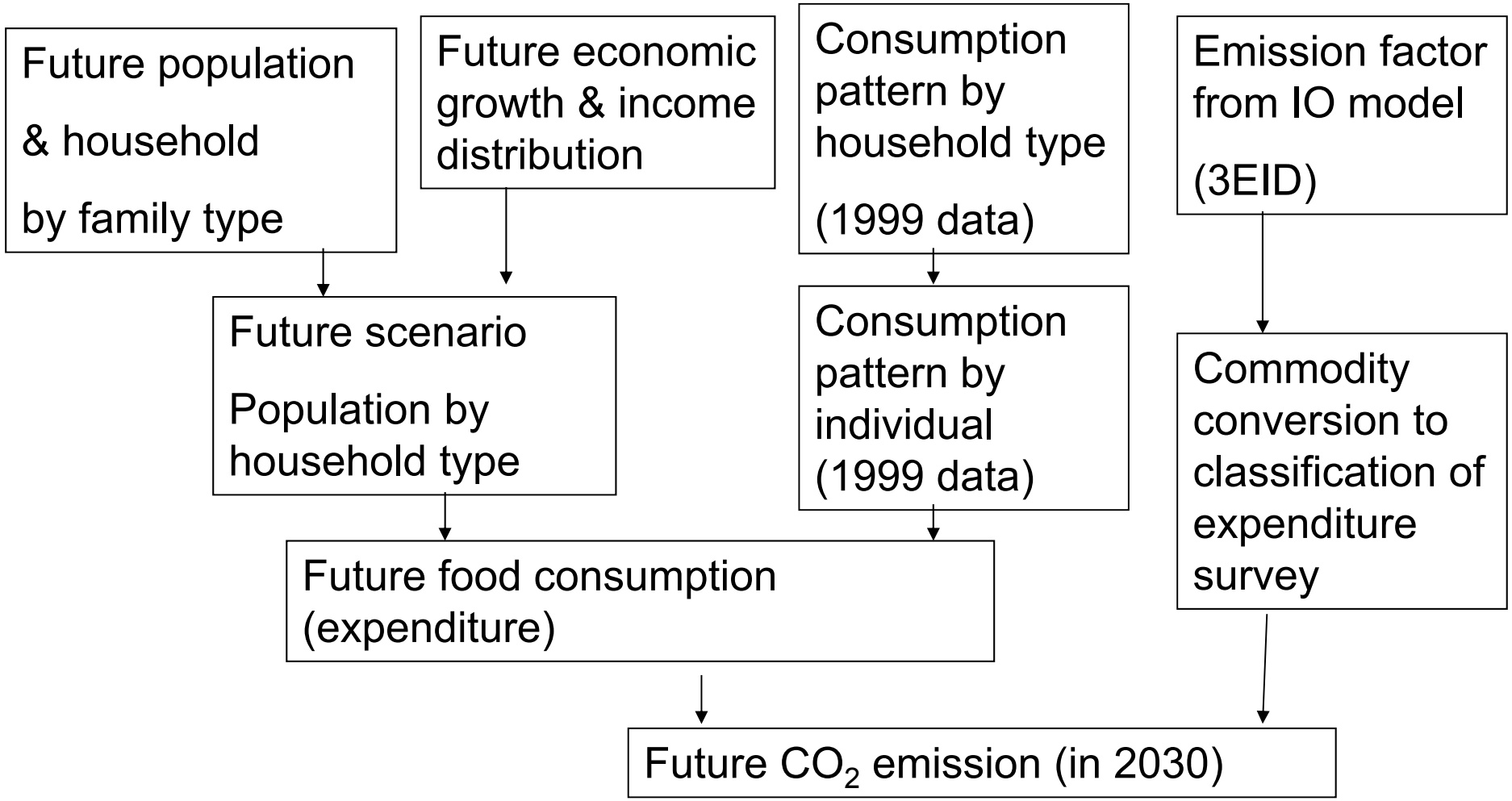


Estimate future food consumption of households by commodity



Estimate future CO_2 emission from food consumption

Estimation Flow



Household type

By age of householder	20s,30s,40s,50s,60s, over 70
By family structure	single
	nuclear
	other
By (equivalent) income $\frac{(\text{Household income})}{\sqrt{\text{Number of household}}}$	-200, 200-300, 300-400
	400-500,500-600,600-700
	700-

Estimation of consumption per capita

Household expenditure data is surveyed by household (micro data) for 70 food products

→need to breakdown to individuals

$$E_x = \sum_k a_{i,j,k} e_{x,k}$$

E: consumption by household x

e: number of household member of age k in household x

a: coefficient of regression

i: family structure

j: family income

k: age of household member

Future Scenarios

- Economical scenario
  - Based on IPCC scenario

GDP rowth rate	A1	1.7%
	A2	1.1%
	B1	1.9%
	B2	1.3%

Future Scenarios

- Population & household scenario
  - Population estimation by National Institute of Population and Social Security Research
  - Population is allocated to each household type by simplified allocation model (Yoshikawa et al.,2009)

Condition in 2030

Scenario		population (million)	households (million)	single households (million)
High	H	118	48.9	18.3
Middle	M	115	48.8	18.2
Low	L	113	48.7	18.1

Results

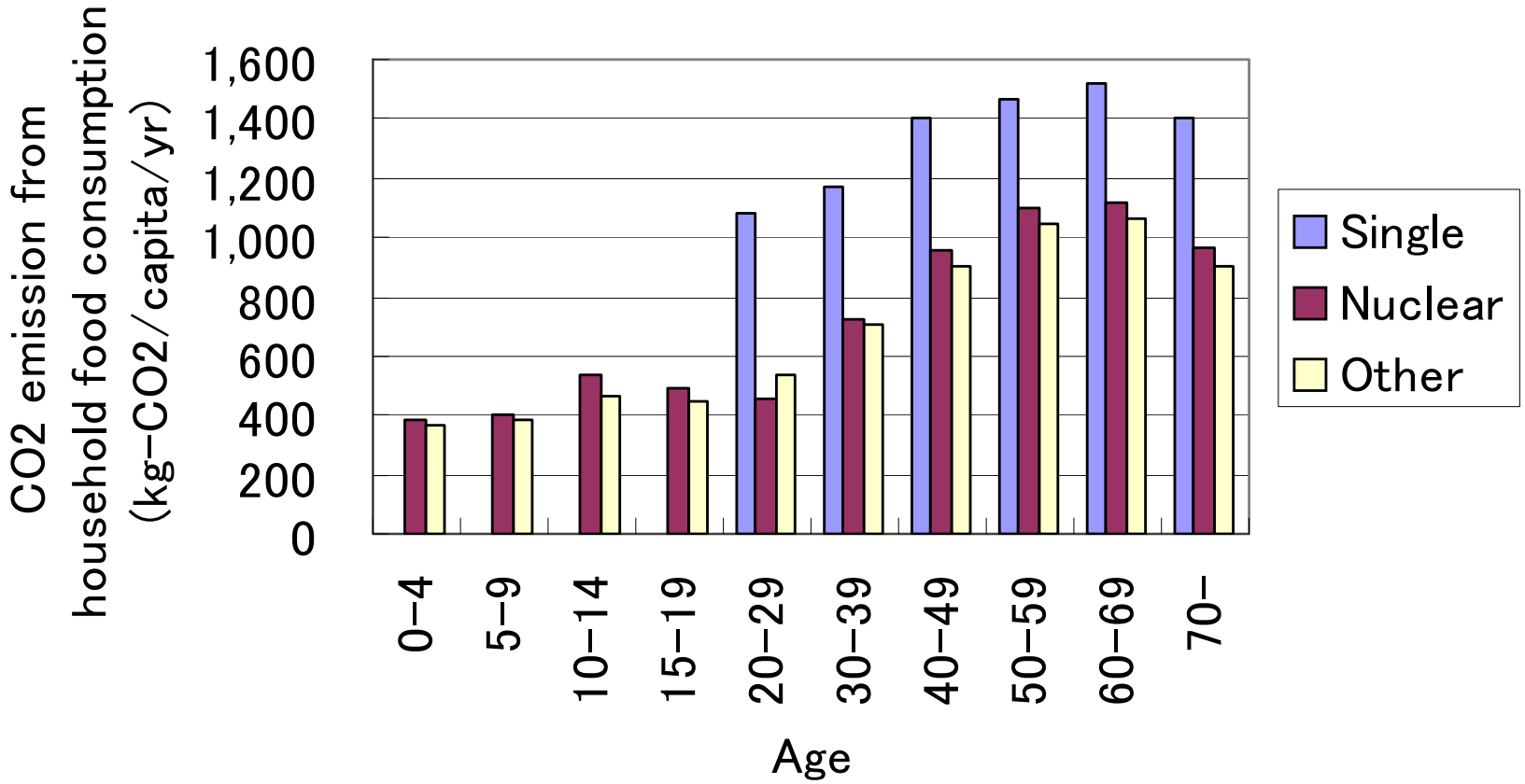
- Significance of regression coefficient

	cereals	fishery products	livestock products	fruits & vegetables
ratio of 5% significant	55%	49%	52%	40%
number of parameters	1120	1120	3360	5600

	seasonings	cooked meals	beverages	food services
ratio of 5% significant	39%	41%	25%	29%
number of parameters	3640	3080	6440	1400

Results

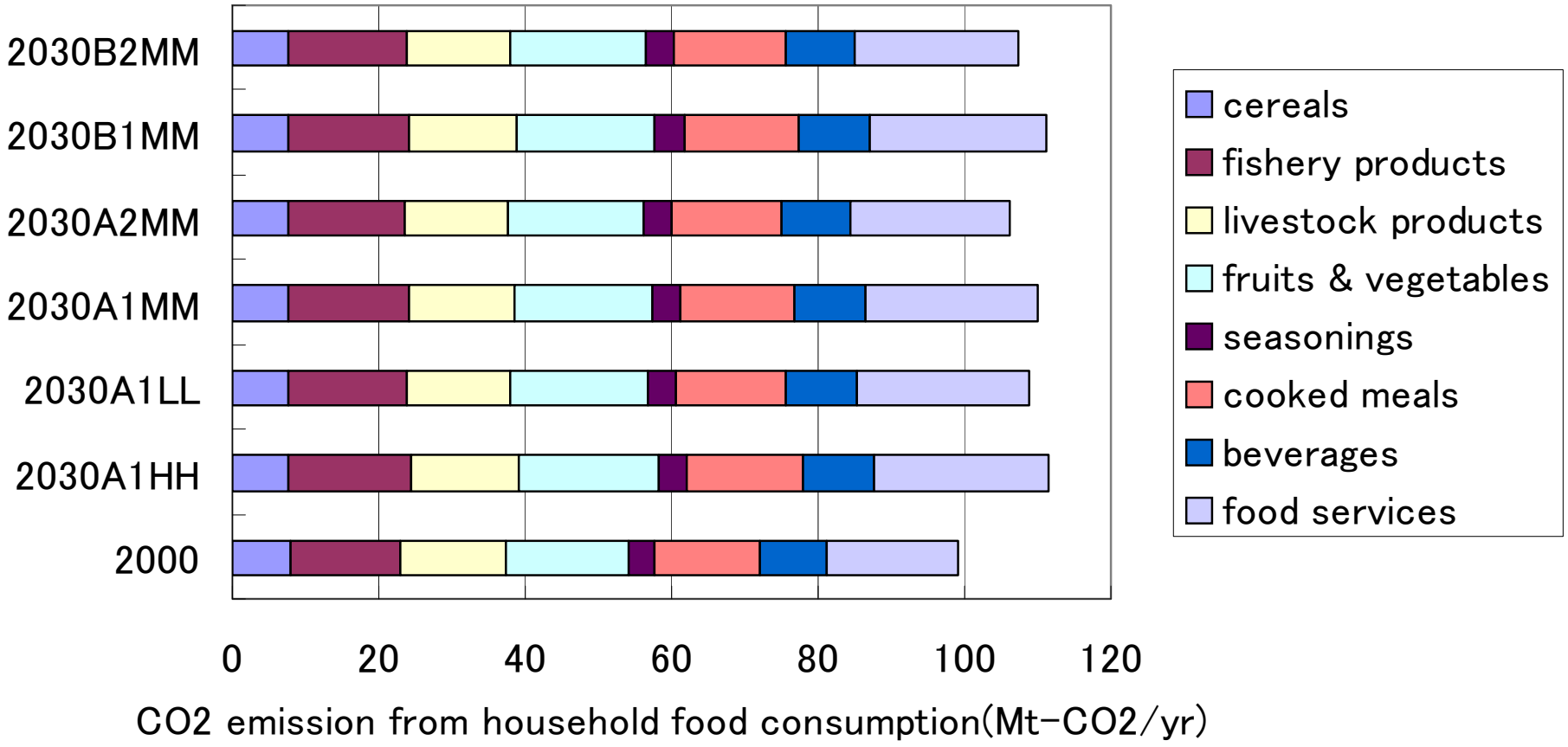
- CO_2 emission from household food consumption per capita



- Including : effect of Income, effect to other household members
- Excluding: expenditure from allowance

Results

- Estimation in future scenario



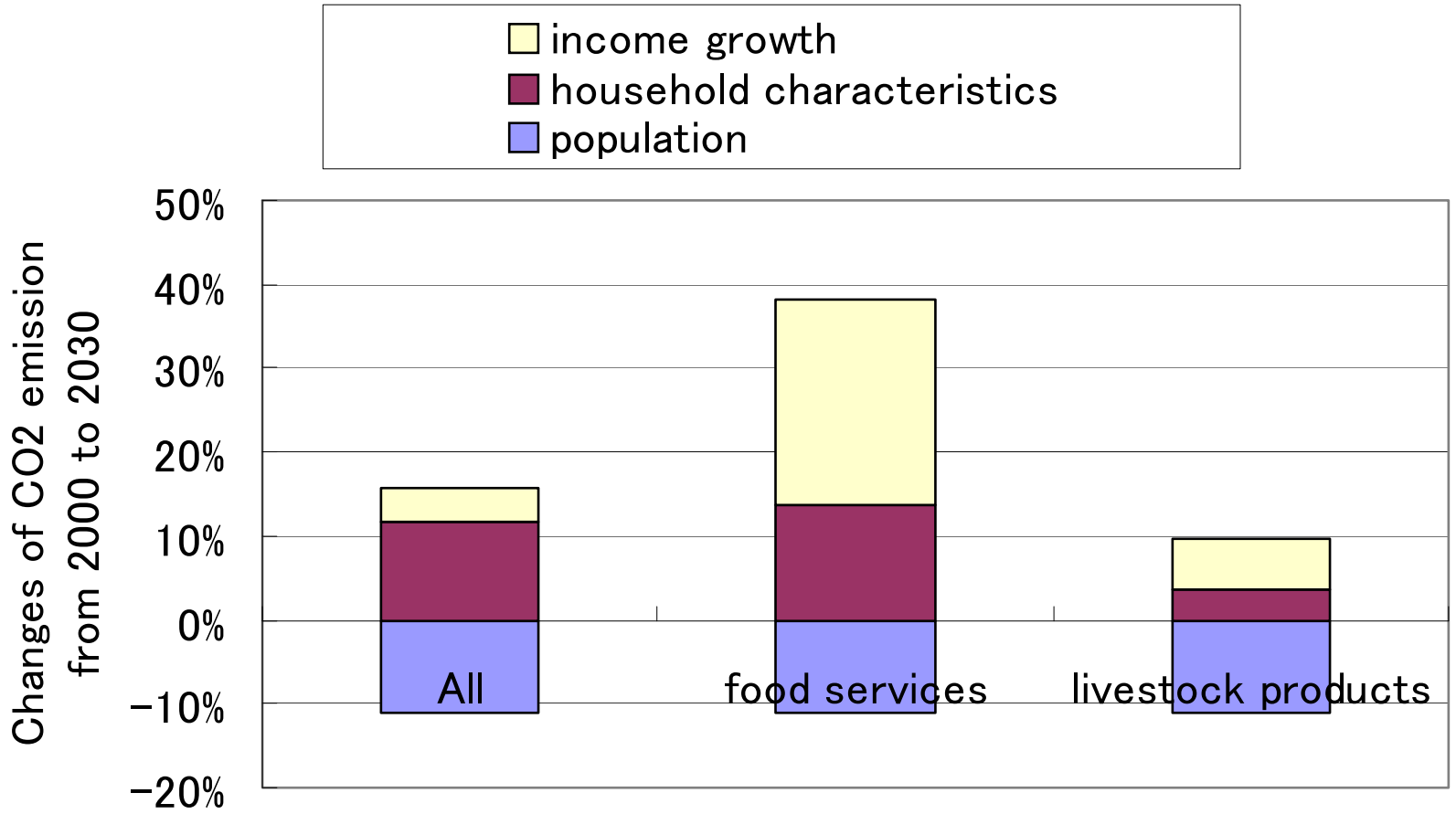
Results

- Emission change ratio from 2000

	cereals	fishery products	livestock products	cooked meals	food services	Total
2030A1HH	−1.3%	10.5%	1.3%	9.6%	34.1%	12.6%
2030A1LL	−4.5%	8.7%	−3.1%	5.9%	31.7%	9.8%
2030A1MM	−3.0%	9.6%	−1.0%	7.6%	32.8%	11.1%
2030A2MM	−3.4%	6.8%	−3.2%	5.0%	22.4%	7.3%
2030B1MM	−2.9%	10.4%	−0.4%	8.4%	36.2%	12.3%
2030B2MM	−3.2%	7.7%	−2.5%	5.8%	25.6%	8.5%

Results

- Factors of changes CO2 emission to 2030



Conclusion

- Estimated future CO_2 emission from household food consumption by scenario analysis

- Should consider more factor

  (ex. cohort effect)