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Consumption patterns of Polish households – cross-sectional analysis

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Poland

Outline

1. Background: aging population in Poland
2. Data: demographic factors
3. A cross-section consumption function
4. Methods
5. Results
6. Further work

Aging population in Poland

Main reasons :

- low birth rates: Polish woman has **1.3** children (on average). It would take **2.1** to replace generations.
- lengthening the average life expectancy: from almost **68** in 1960 to above **78** (last year).
- emigration: over the last two decades, a number of Poles have left their country.

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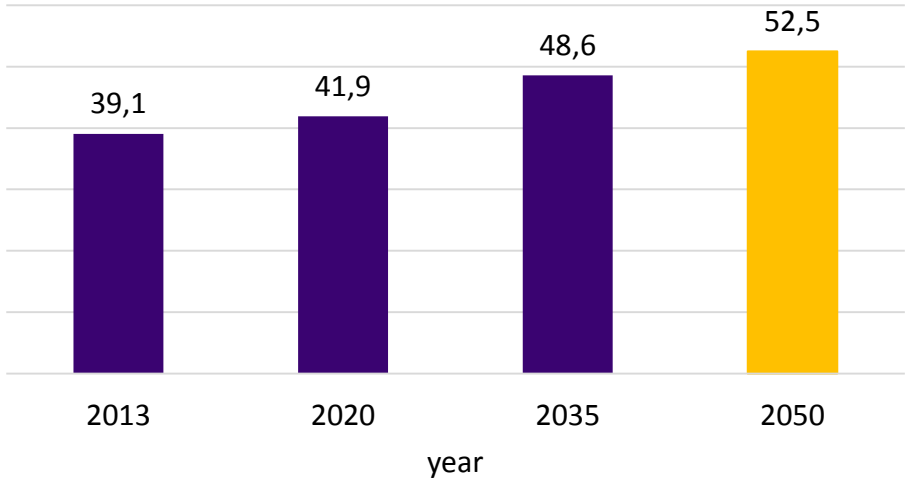
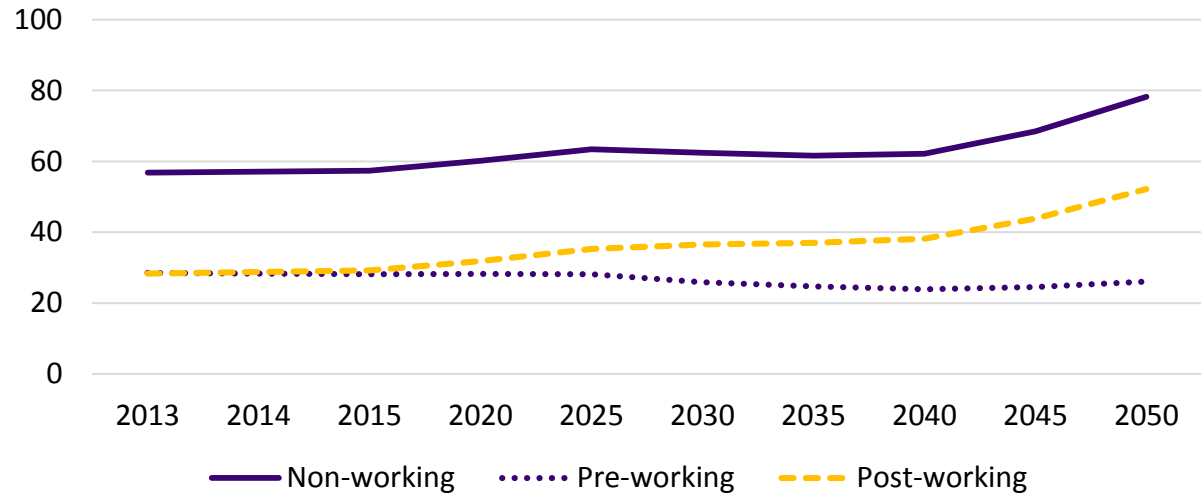
Aging population in Poland

- In 2050, half of the population in Poland will be over the age of 50.
- The share of the population above 65 is expected to almost double by 2030. With the current retirement age, the working-age population would shrink by more than 15 percent by 2035.
- As the population is aging, it has also started to decline: from about 38.6 million in 1995, to 38 million in 2010, to an expected 32 million in 2050.

Median age of population*



Dependency ratio



Impact of demographic changes:

labor supply, demand for educational and medical services, revenues and expenses of the social security system and **consumption**.

*Source: Central Statistic Office of Poland

Purpose

How demografic factors and age influence on the patterns of Polish households consumption?

The objective of this research is **to identify households consumption patterns in Poland**.

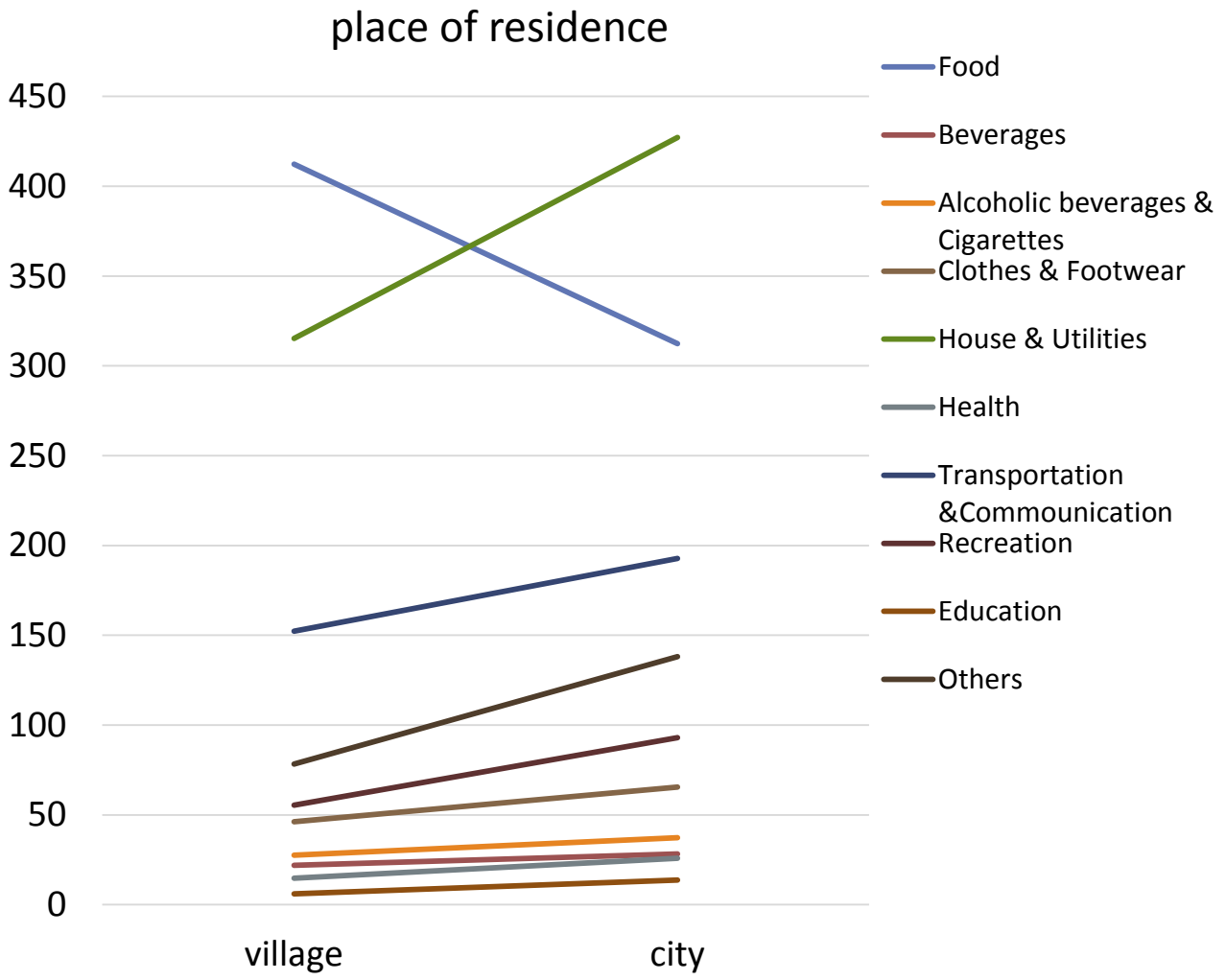
Data: Household budget survey (HBS)

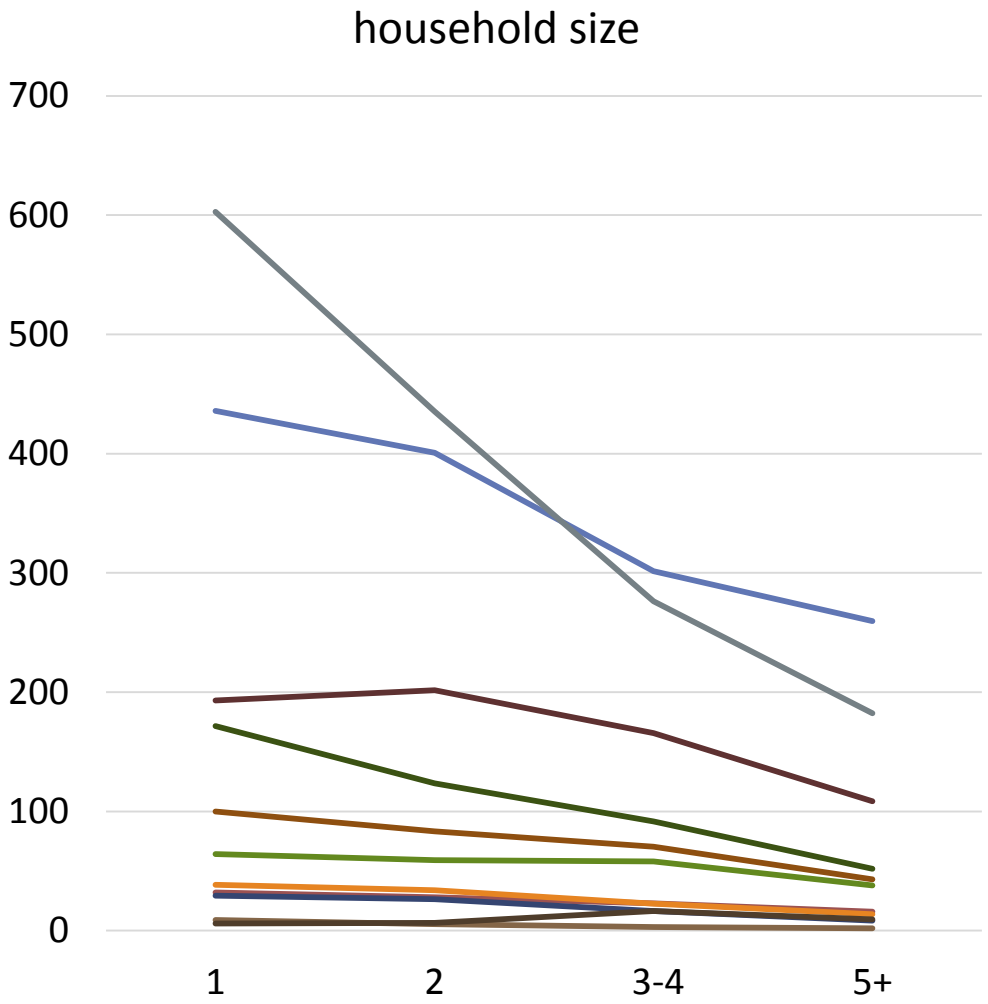
The HBS is a cross-section survey of Polish household data conducted by the Central Statistical Office (CSO) of Poland.
Since 1957, the CSO has been conducting a budget survey based on the representative method.
Since 1992 the HBS is based on territorial approach with monthly rotation of households.

The data have rich information about household i.e.:

- **expenditures by categories,**
- **sources of income,**
- **household characteristics such as type of residence, area of residence, characteristics of household members.**

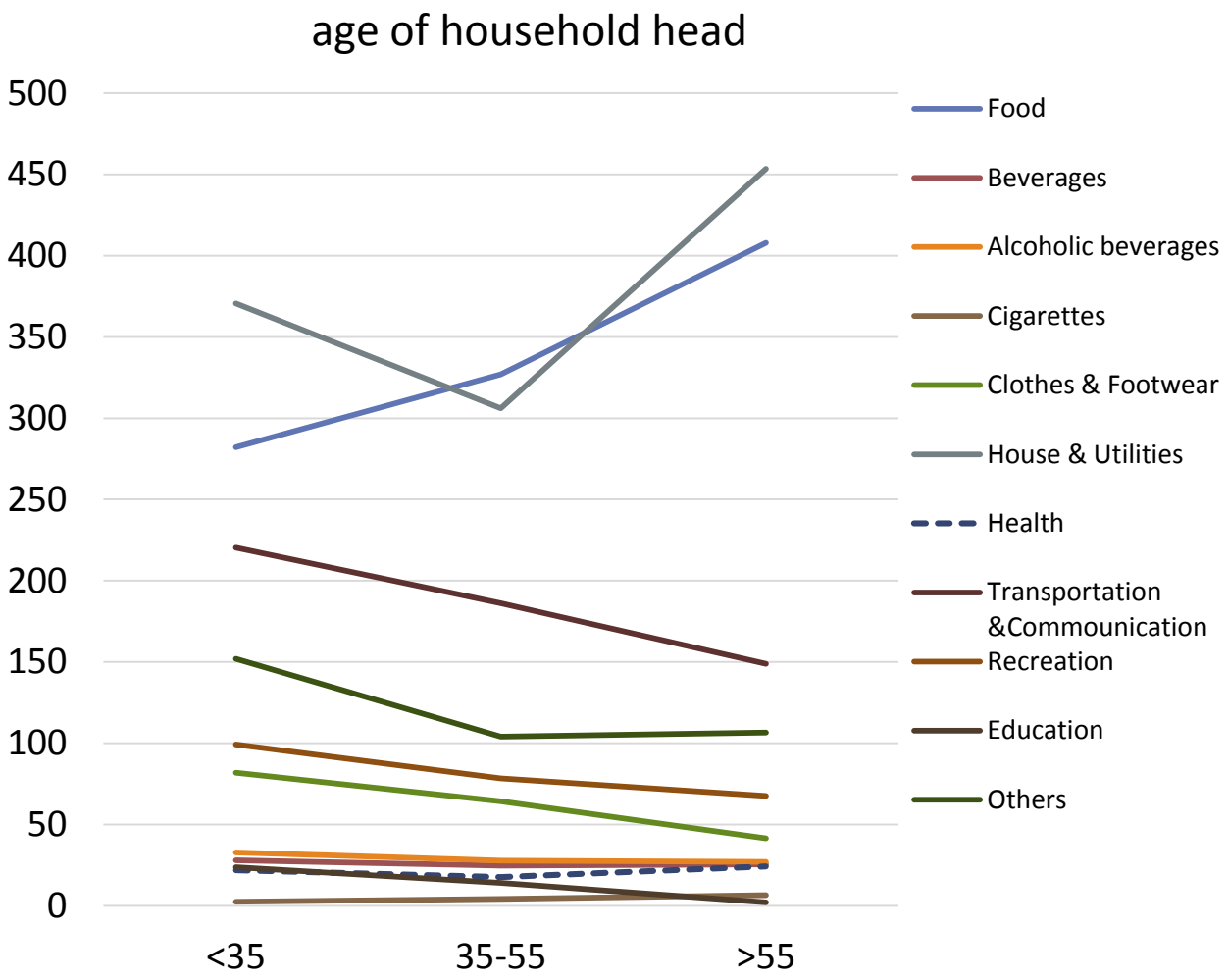
Average monthly households expenditures per capita in PLN by:

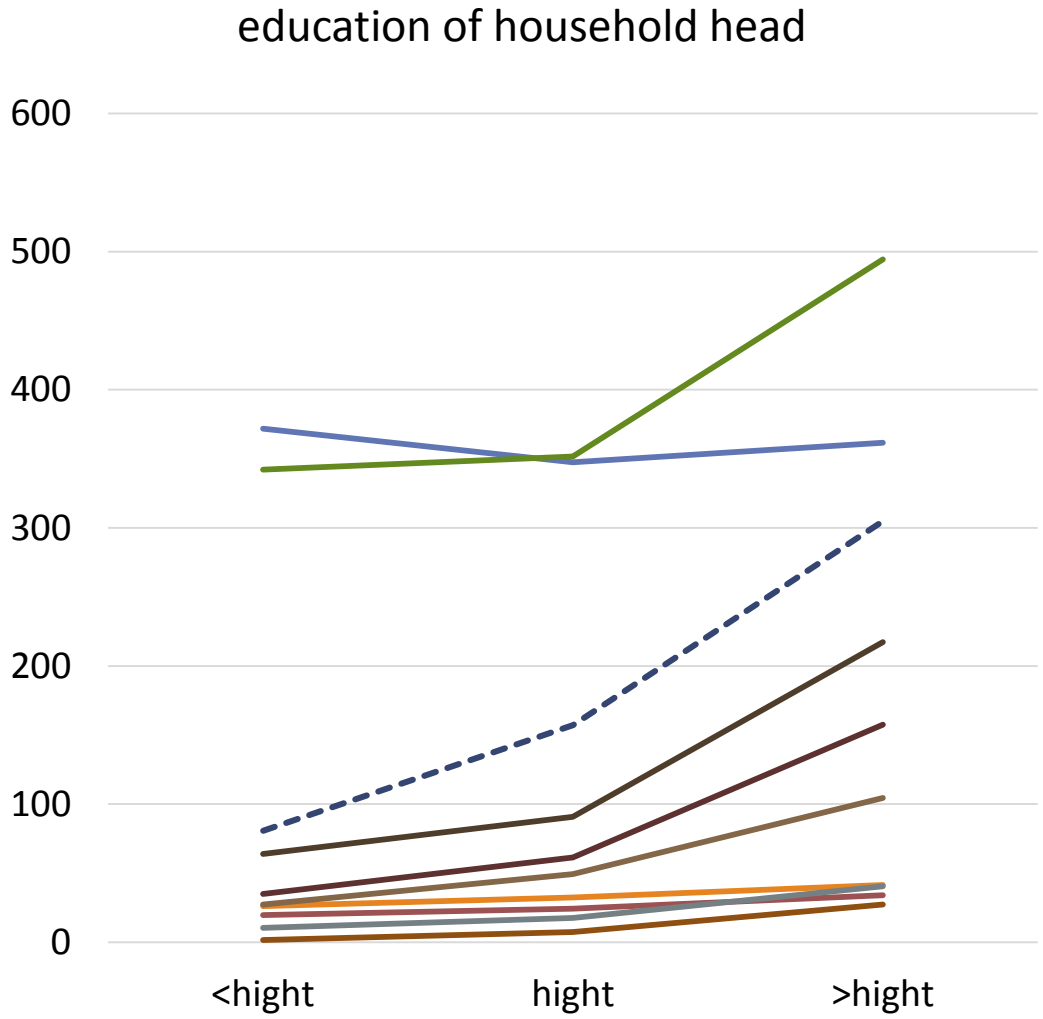




*Source: Central Statistic Office of Poland, HBS 2013

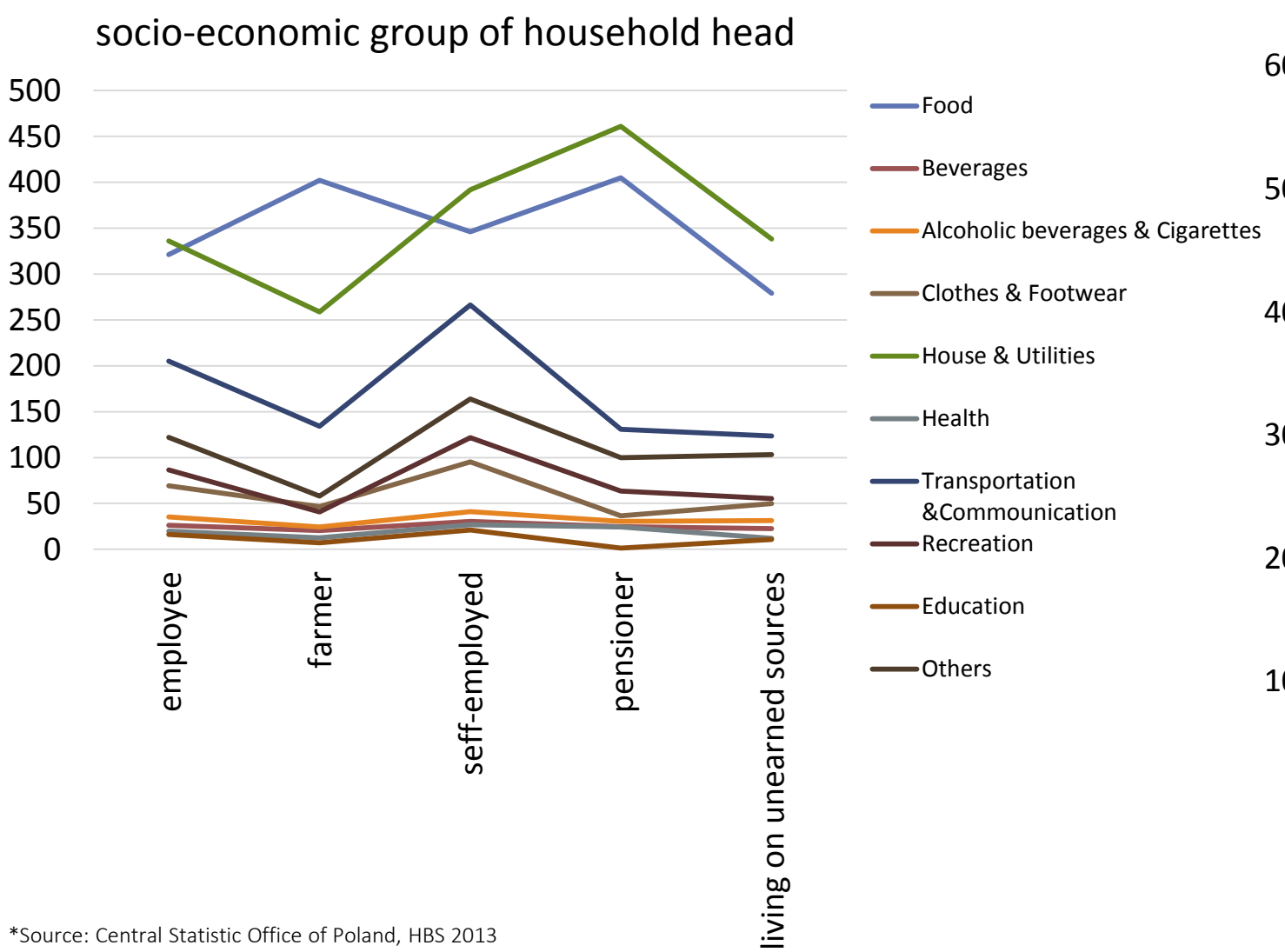
Average monthly households expenditures per capita in PLN by:

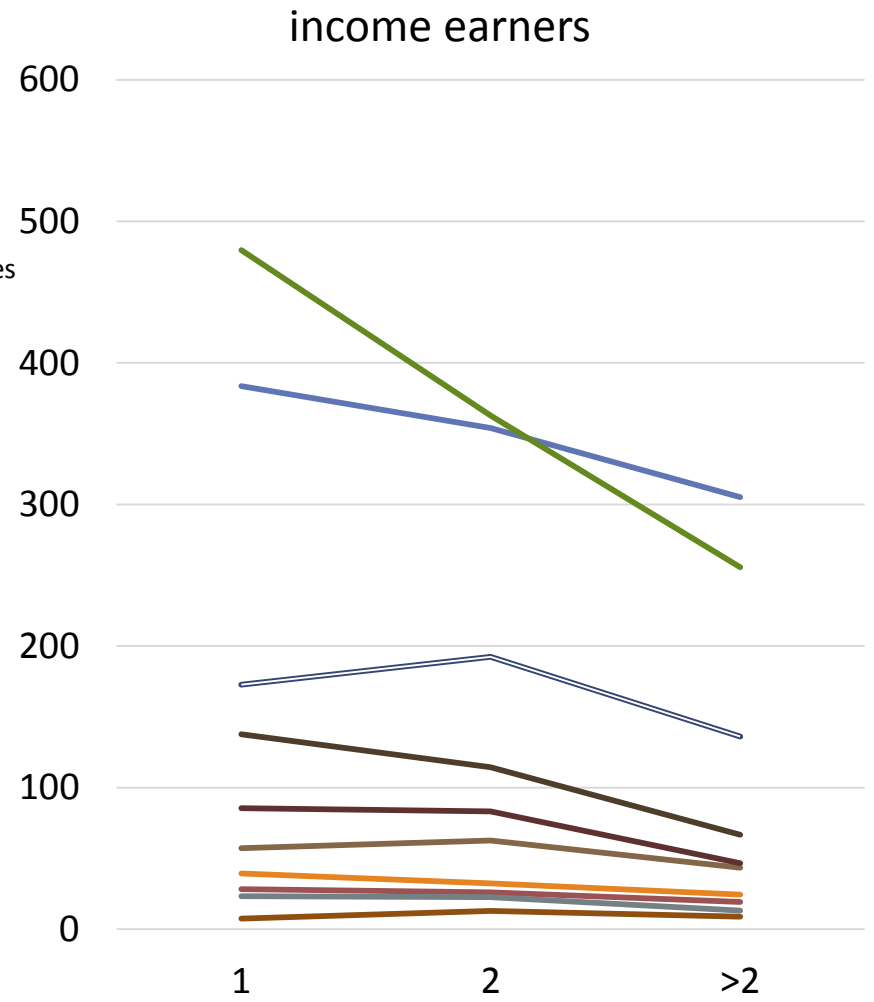




*Source: Central Statistic Office of Poland, HBS 2013

Average monthly households expenditures per capita in PLN by:





*Source: Central Statistic Office of Poland, HBS 2013

Estimation equation

$$C_i^h = \underbrace{(\alpha_{i0} + \sum_{j=1}^{5} \alpha_{ij} Y_j^h}_{\text{PLEC- Piecewise Linear Engel Curve}} + \sum_{k=1}^{14} \beta_{ik} D_k^h) \underbrace{(\sum_{g=1}^{8} w_g n_g^h)}_{\text{weighted size of household h for each good}} + u_i \,,$$

C_i^h - household *h*'s consumption of good *i*,
Y_j^h - amount of household *h*'s per capita income within *jth* income bracket,
D_k^h - *kth* demographic dummy variable in household *h*, represented by a zero-one,
n_g^h - number of family members in age group *g* in household *h*,
u_i - disturbance term with assumption of independently and identically distributed across households for the good *i*,

$\alpha_{i0}, \alpha_{ij}, \beta_{ik}, w_g$ - coefficients to be estimated, they represent marginal propensity to consume in each income bracket, demographic effects, and Adult Equivalency Weights (AEW), respectively.

Independent variables

Income brackets (each contains 20% of total households):

B_1 = [0 – 612,8] PLN,
B_2 = [612,81 – 846,83] PLN,
B_3 = [846,84 – 1124,42] PLN,
B_4 = [1124,43 – 1558,36] PLN,
B_5 = [1558,37 – ∞) PLN.

Demographic factors:

- place of residence: village, city;
- household size: 1, 2, 3-4, 5 and above;
- age of household head: <35, 35-55, > 55;
- education of household head: lower than high school, high school, higher than high school;
- socio-economic group of household head: employee, farmer, self-employed, retiree or pensioner, living on unearned sources;
- number of income earners: 1, 2, >2.

Age groups:

0-5, 6-15, 16-20, 21-30, 31-40, 41-50, 51-65, 66+

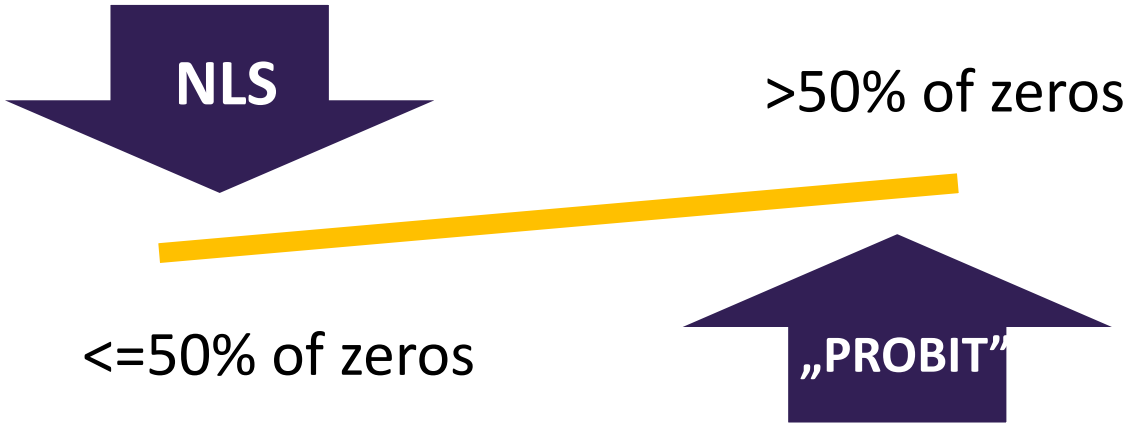
Percentage of zero observation

Grains, cereals and cereal products	2,82%	Tools and equipment for the garden	73,50%
Bread	0,15%	Cleaners and services related to running a household	5,66%
Meet	13,49%	Pharmaceutical and medical products, therapeutic equipment	23,58%
Poultry and offal	6,03%	Out-patient services	62,63%
Cold meats	0,74%	Hospital services	98,93%
Fish and seafood	23,98%	Purchase of vehicles	98,38%
Milk and dairy products	0,80%	Operation of personal transport equipment	41,79%
Cheese and eggs	0,66%	Transport services	64,74%
Butter and other animal fats	20,48%	Postal services	93,62%
Vegetable fats	10,05%	Telephone equipment	98,10%
Citrus fruits and bananas	15,81%	Telephone and telefax services	3,03%
Other fruits and processed fruit	6,89%	Audio-visual, photographic and information processing equipment	87,75%
Potatoes	23,77%	Other major durables for recreational and culture	99,49%
Other vegetables and mushrooms	0,38%	Games, toys, sports equipment	45,30%
Flour, sugar, bakery and confectionery	0,59%	Recreational and cultural services	28,67%
Baby foods	92,68%	Newspapers, books and stationery	34,05%
Other food products	2,82%	Package holidays	91,22%
Non-alcoholic beverages	1,24%	Pre-primary and primary education	93,64%
Alcoholic beverages	39,44%	Secondary and post-secondary non-tertiary education	97,82%
Tobacco	92,45%	Tertiary education	98,58%
Clothes	33,83%	Education not definable by level	98,10%
Men's footwear	86,19%	Catering services	65,65%
Women's footwear	80,87%	Accommodation services	95,90%
Children's footwear	94,80%	Hairdressing services	99,66%
Shoe repairs	99,23%	Cosmetics, hygiene products and personal care appliances	5,20%
Actual rentals for housing	93,02%	Silverware, jewelry, other personal effects	63,09%
Maintenance and repair of the dwelling	79,10%	Articles for children	99,61%
Water supply and miscellaneus services relating to the dwelling	6,96%	Care for children and the elderly	99,40%
Electricity, gas and other fuels	4,95%	Insurance	72,83%
Furniture and furnishing, carpets and other floor covering	88,49%	Financial services	75,34%
Household textiles	82,00%	Funeral services	99,80%
Household appliances	91,97%	Prostitution and other services	97,20%
Glassware, tableware and household utensils	70,10%		

Methods

According to Bardazzi, Barnabani (1998), Ding (2006), choices of estimation this nonlinear equation could be carried out with:

- **nonlinear least square (NLS),**
- tobit model,
- Cragg-Double-Hurdle model,
- **„probit" model (nonlinear probability model).**



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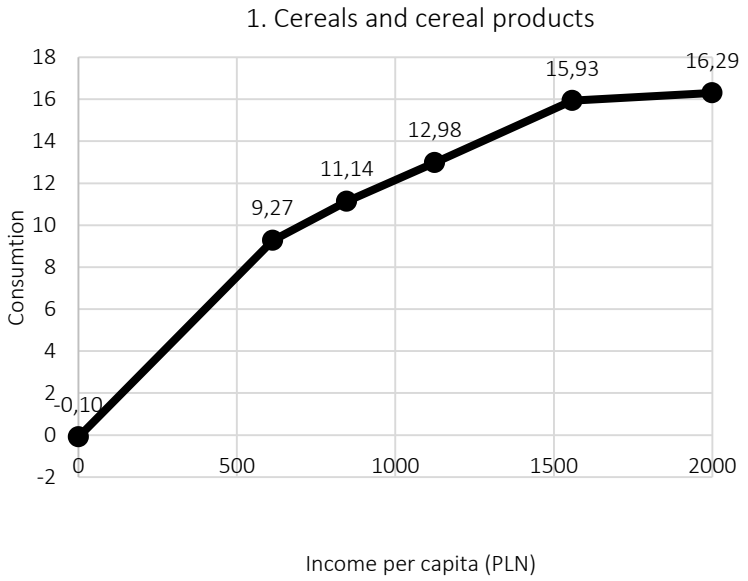
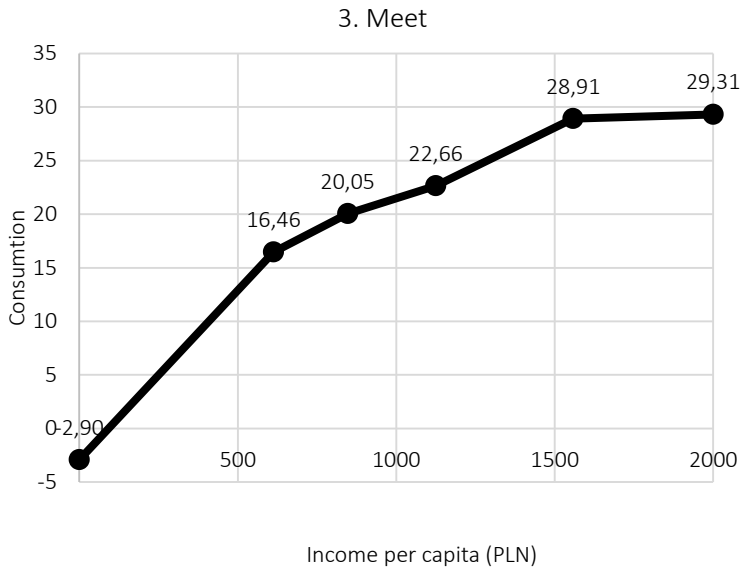
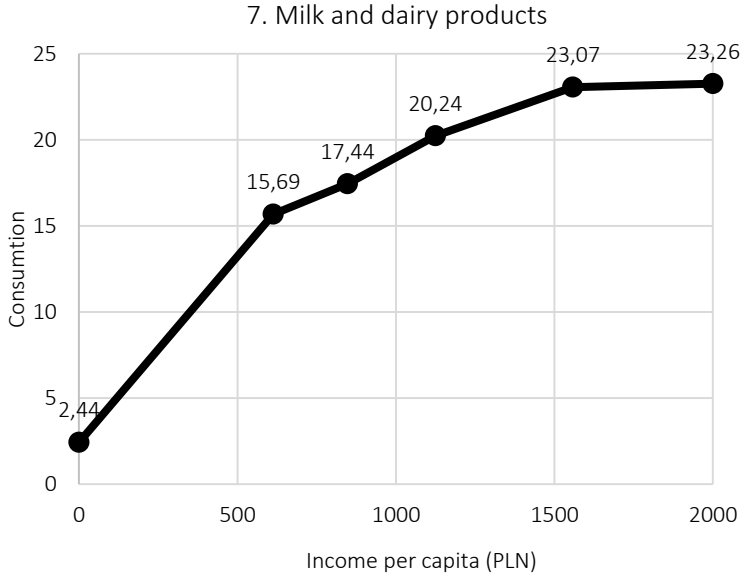
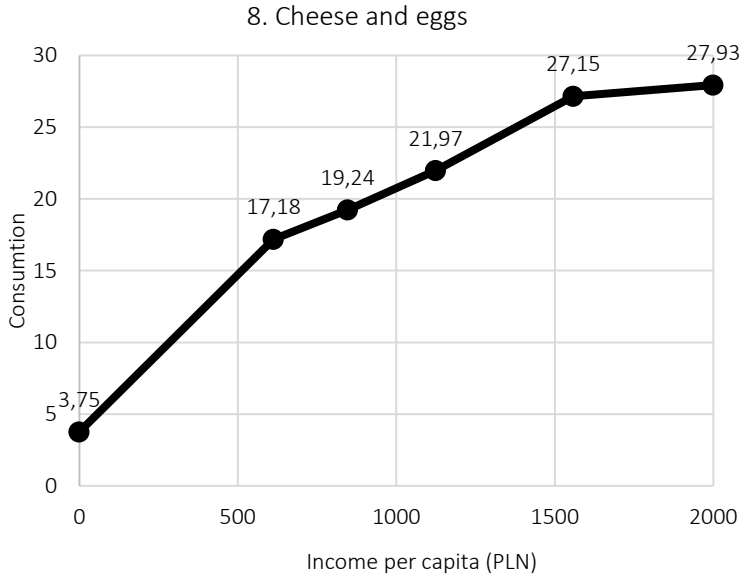
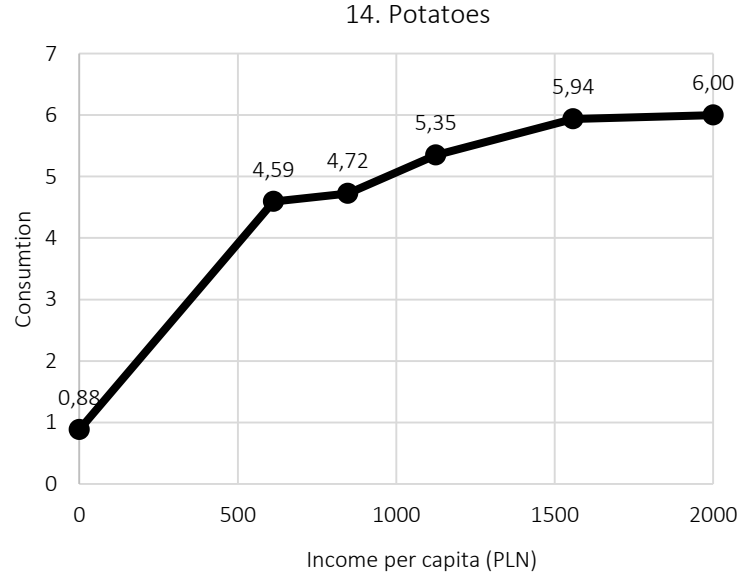
PLEC (selected categories)

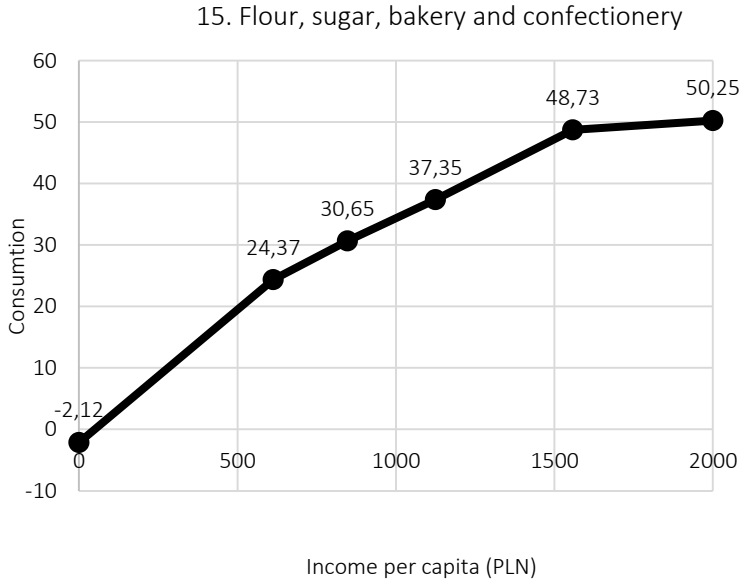












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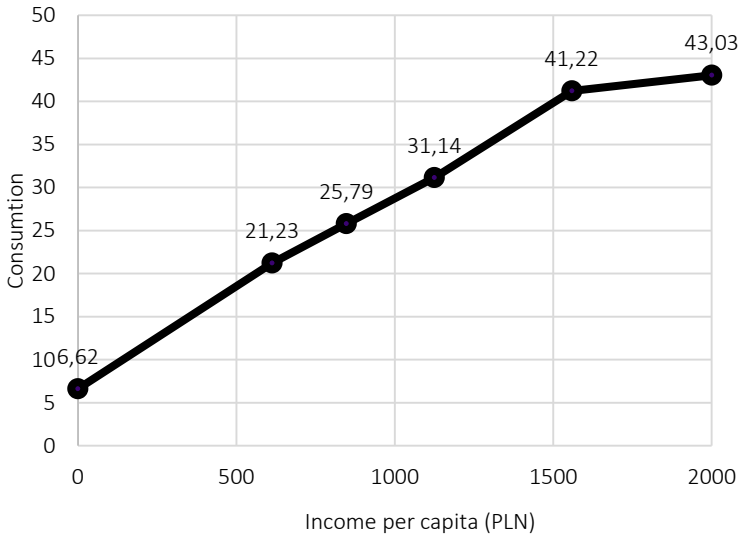
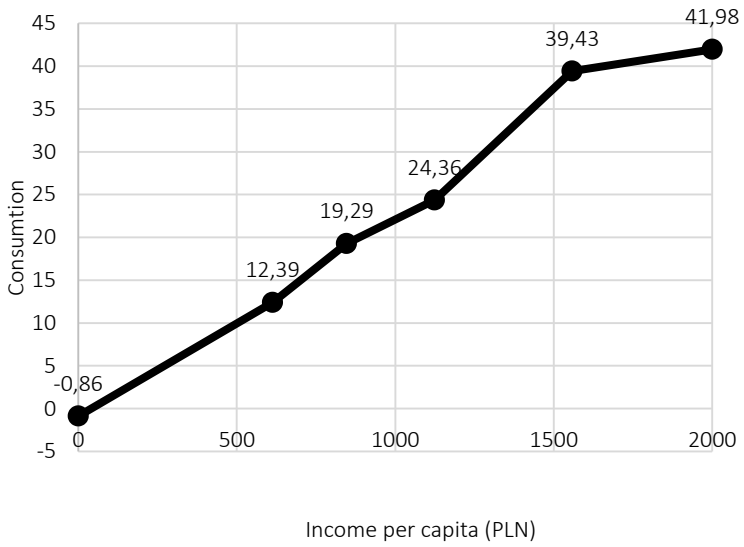
PLEC (selected categories)

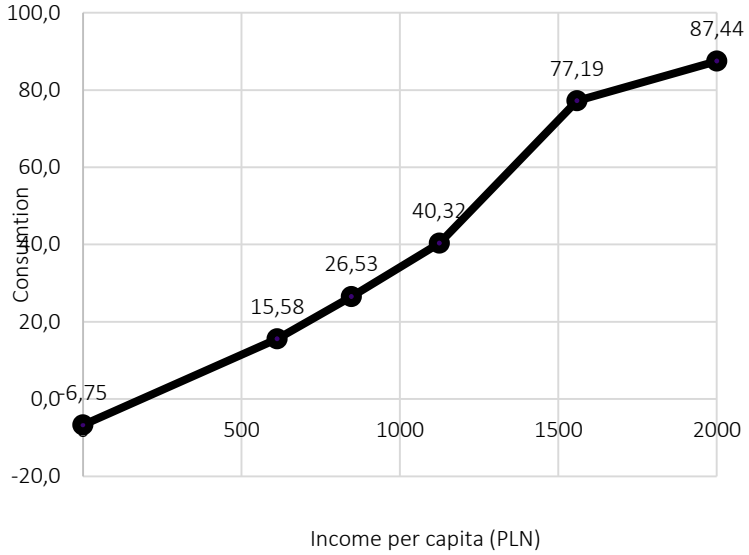
18_19. Non-alcoholic beverages



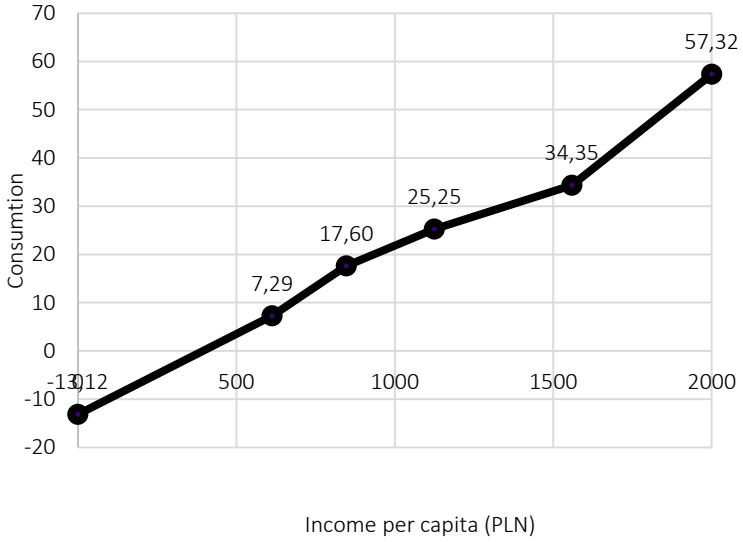
20_21. Alcoholic beverages



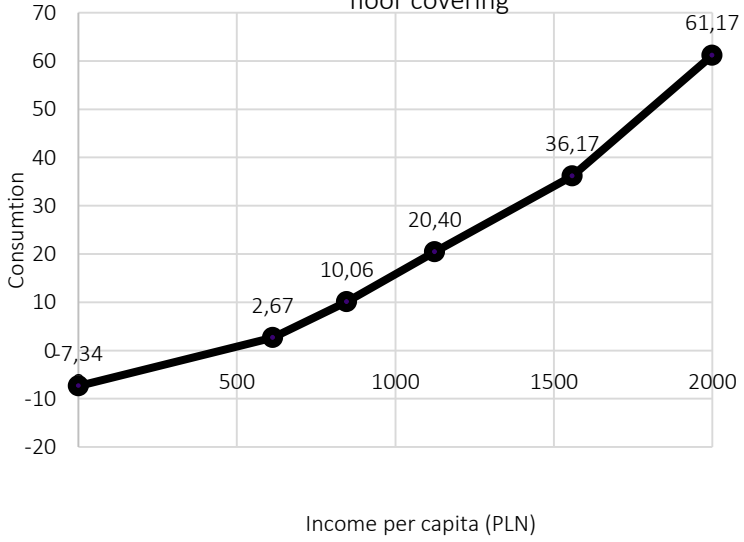
22. Cigarettes



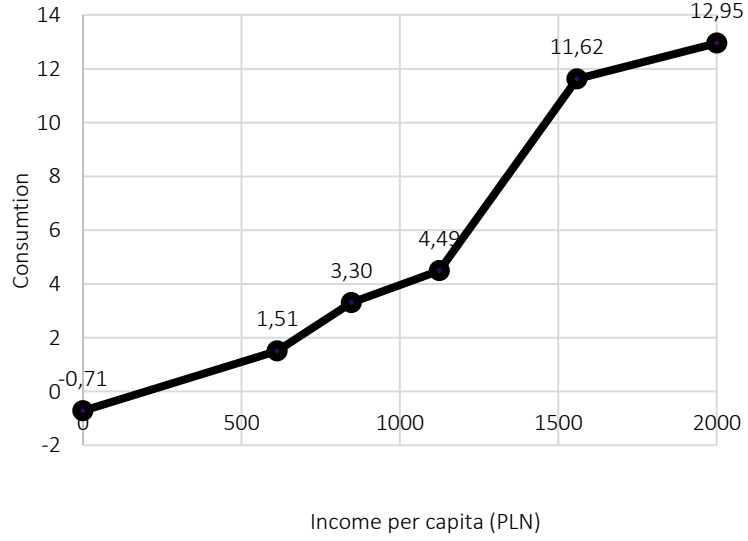
31. Actual rentals for housing



35. Furniture and furnishing, carpets and other floor covering



38. Glassware, tableware and household utensils



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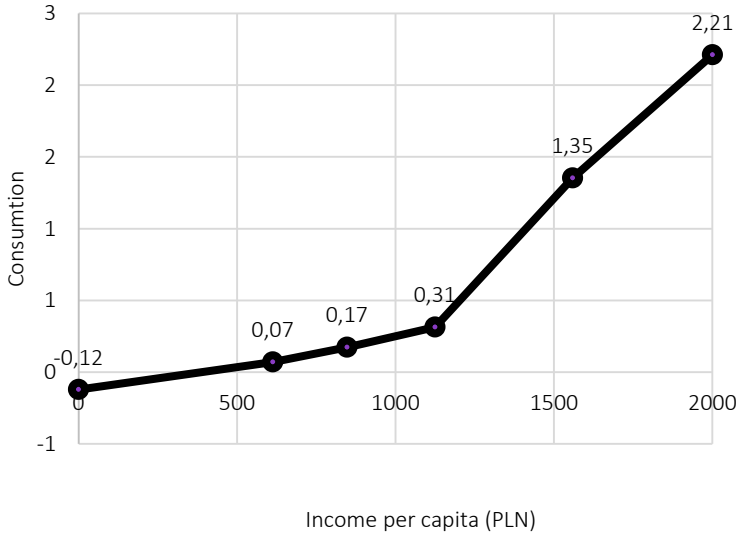
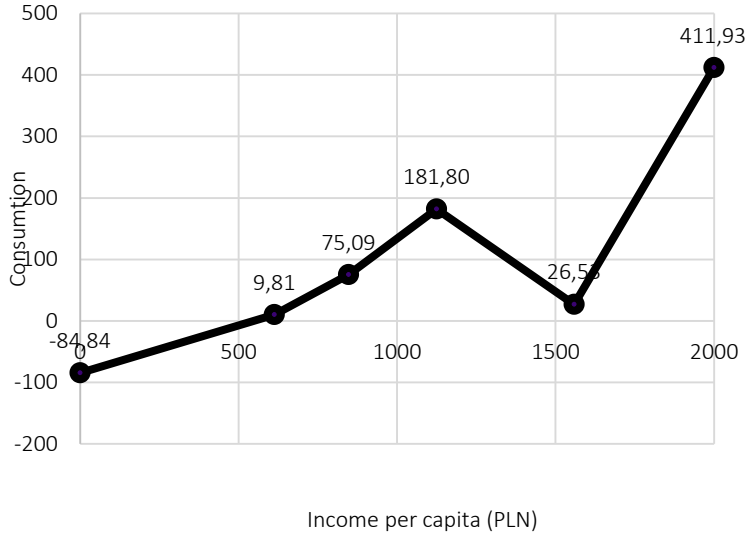
PLEC (selected categories)

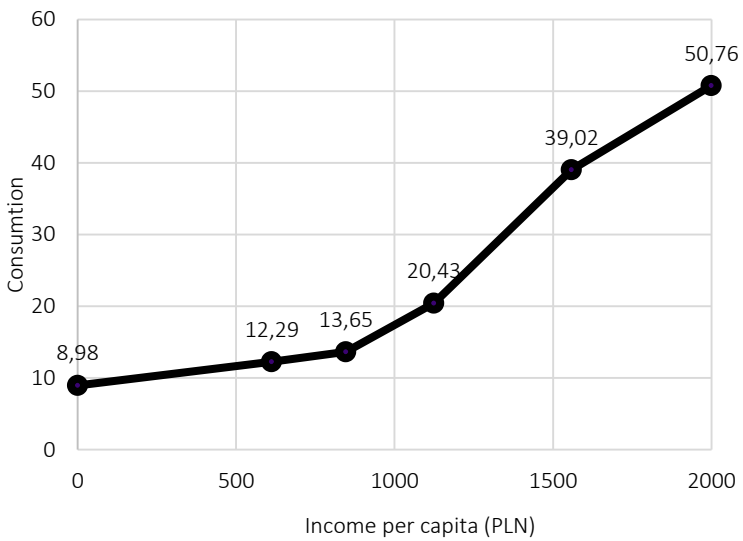
42. Out-patient services



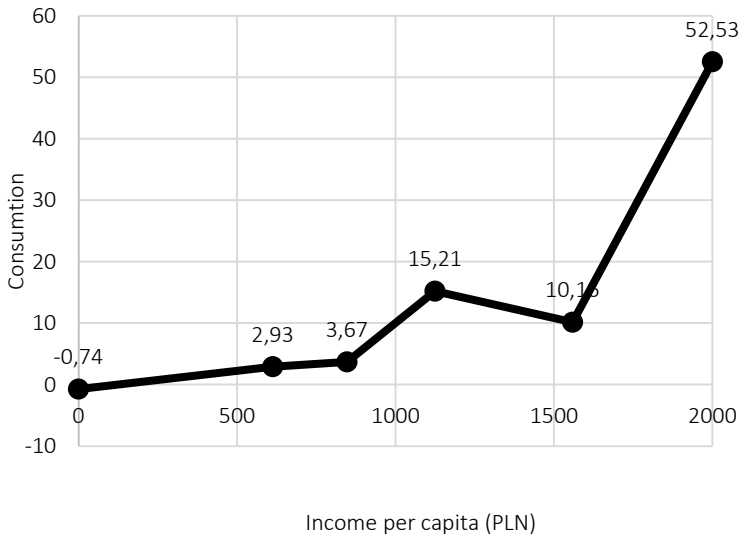
44. Purchase of vehicles



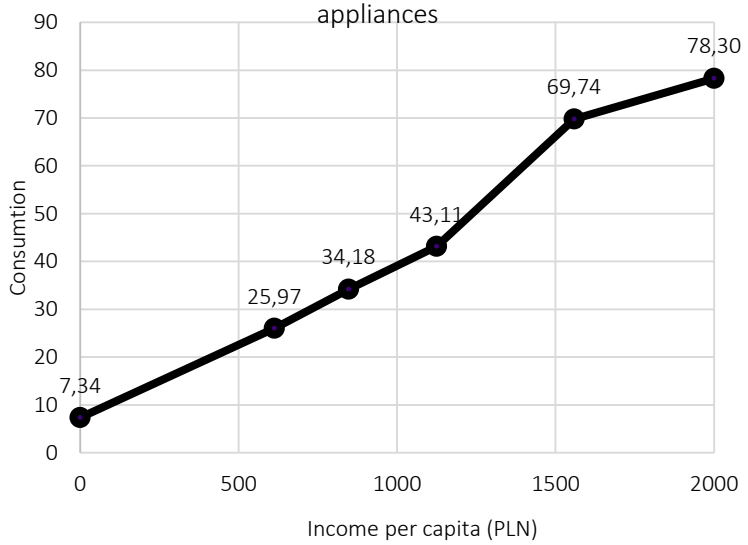
55. Package holidays



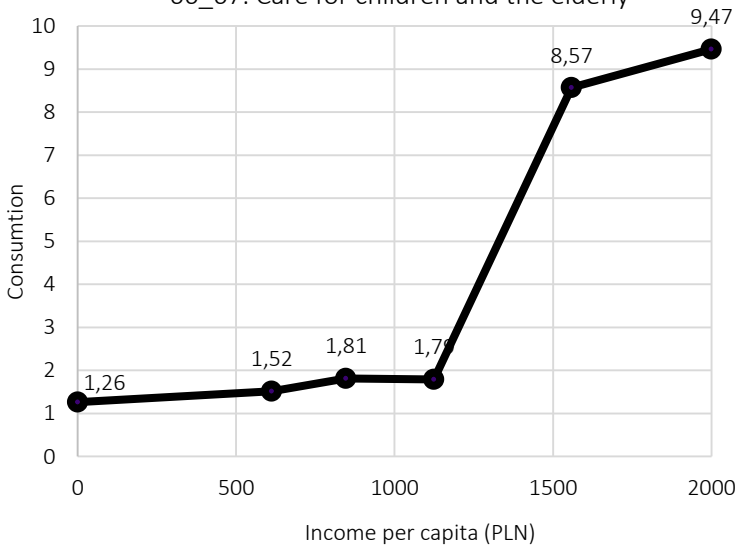
60. Catering services



63. Cosmetics, hygiene products and personal care appliances



66_67. Care for children and the elderly



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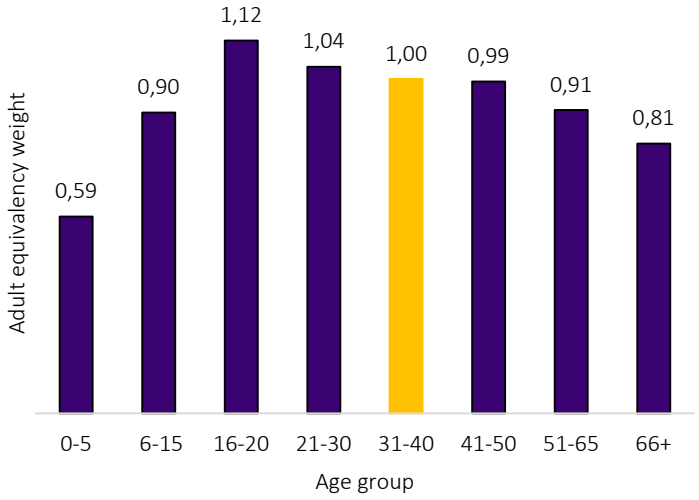
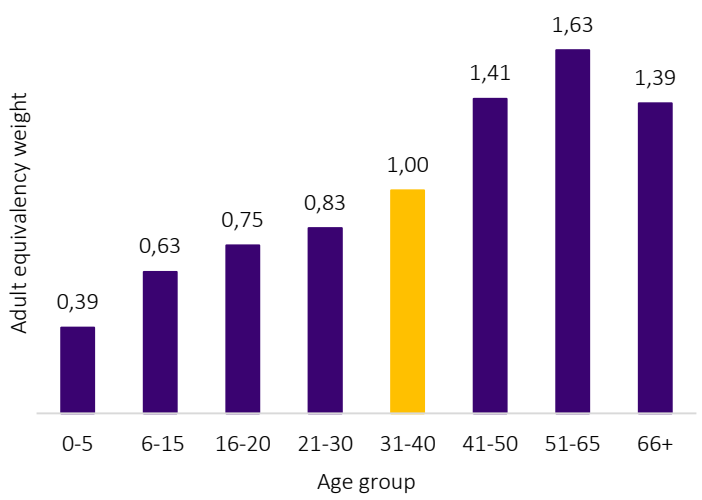
AEW (selected categories)

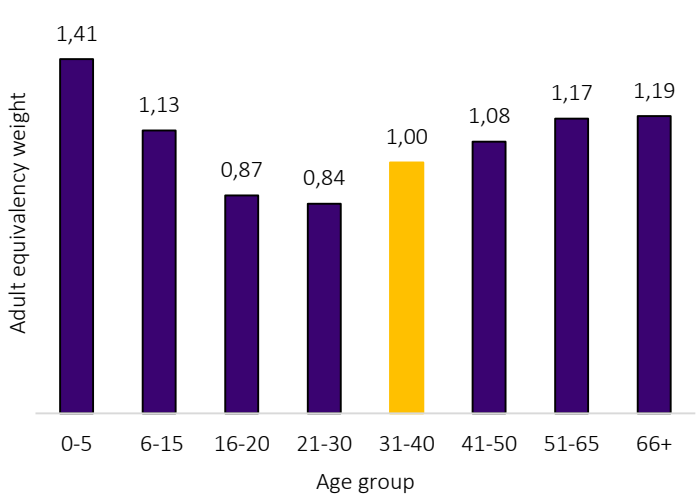
1. Cereals and cereal products



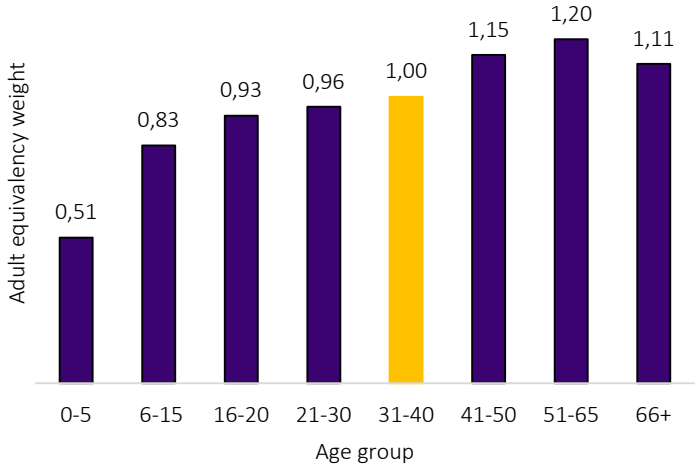
3. Meet



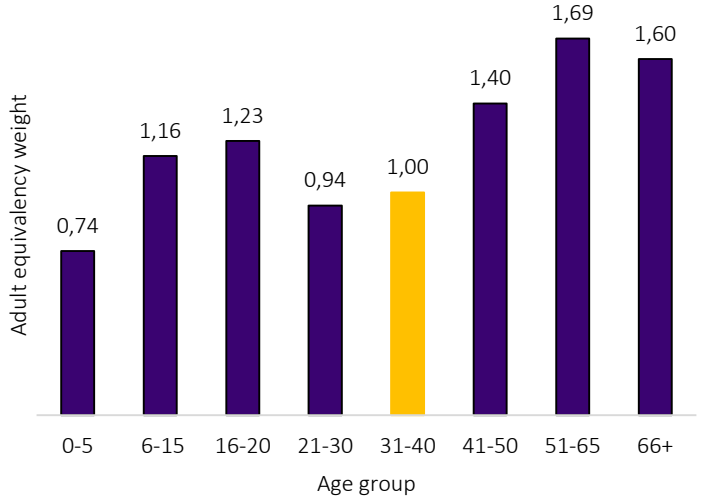
7. Milk and dairy products



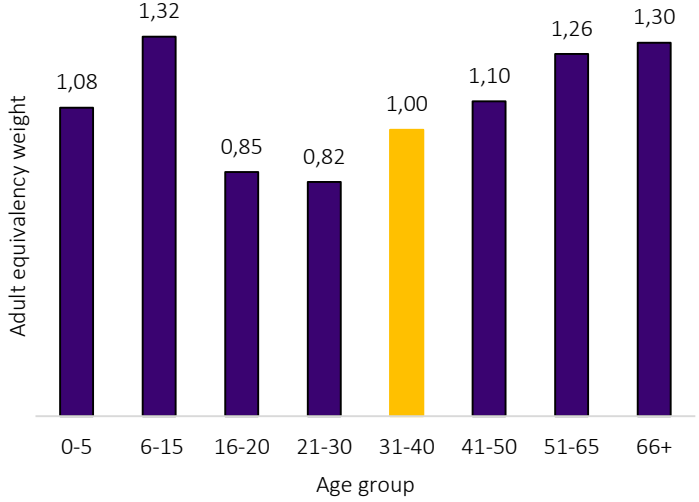
8. Cheese and eggs



14. Potatoes



15. Flour, sugar, bakery and confectionery



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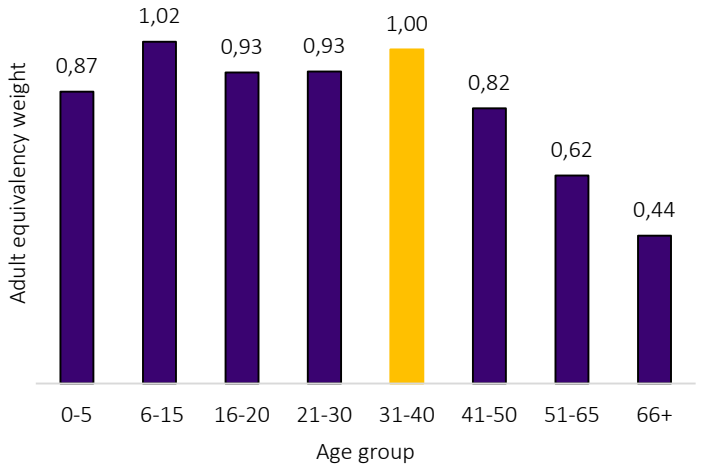
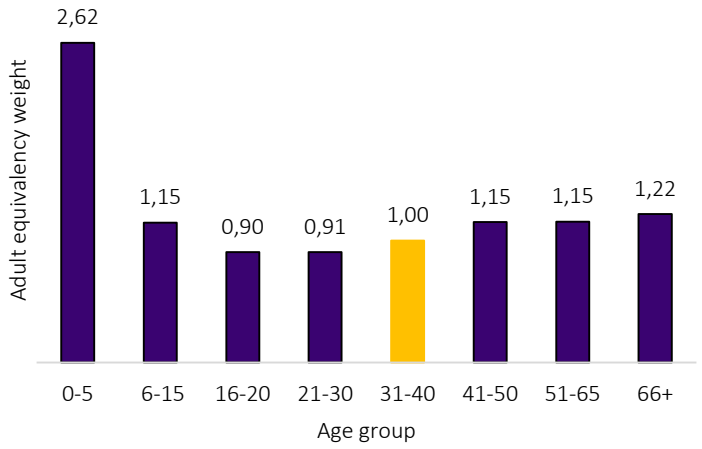
AEW (selected categories)

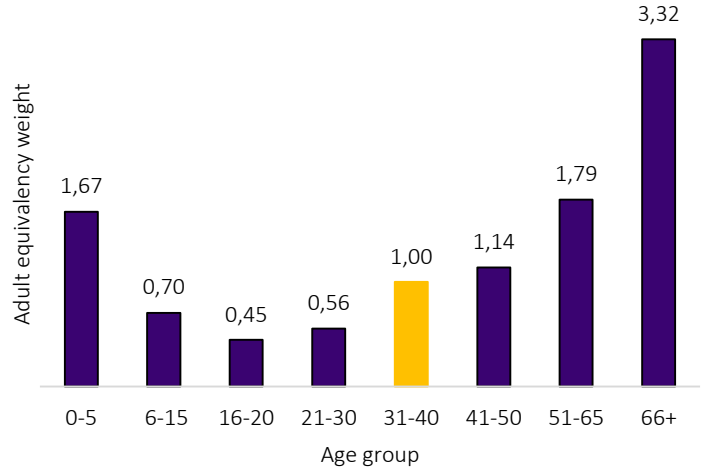
23_26. Clothes



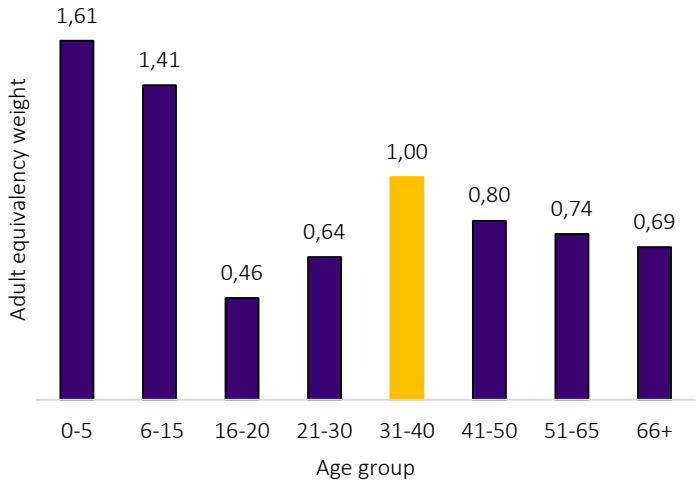
40. Cleaners and services related to running a household



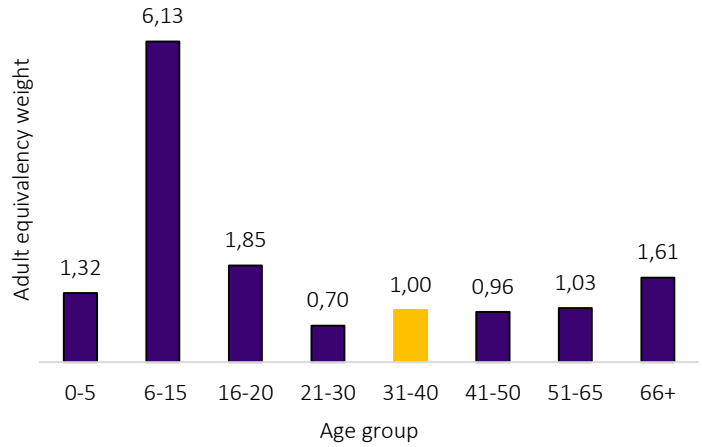
41. Pharmaceutical and medical products. Therapeutic equipment



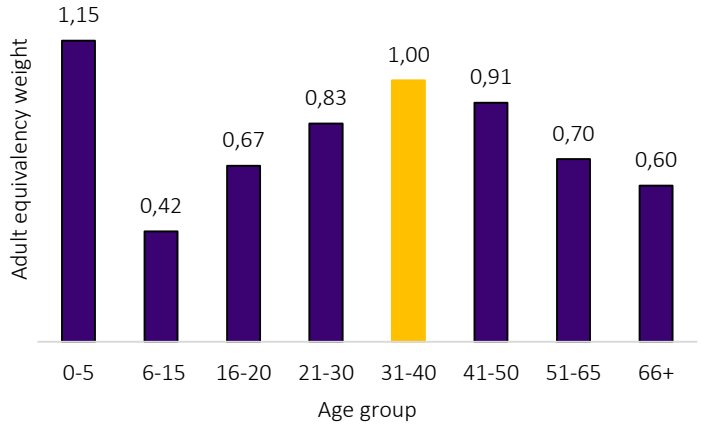
52. Games, toys, sports equipment



54. Books, textbooks, newspapers, magazines, stationery



63. Cosmetics, hygiene products and personal care appliances



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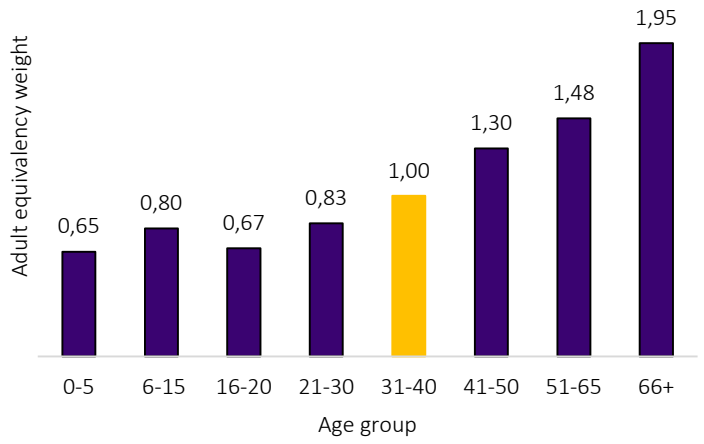
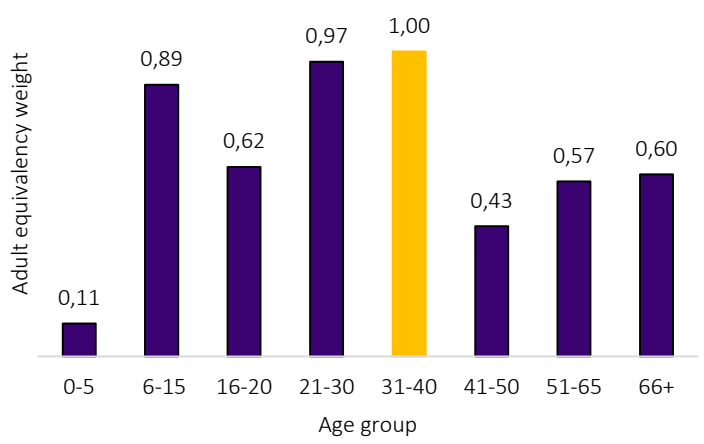
AEW (selected categories)

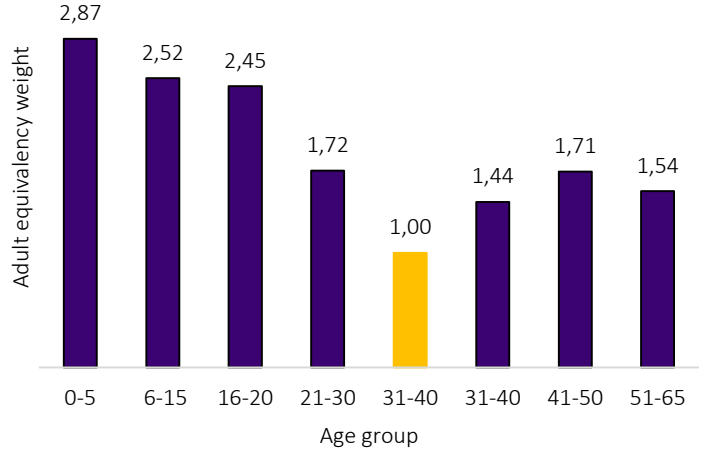
34. Electricity, gas and other fuels



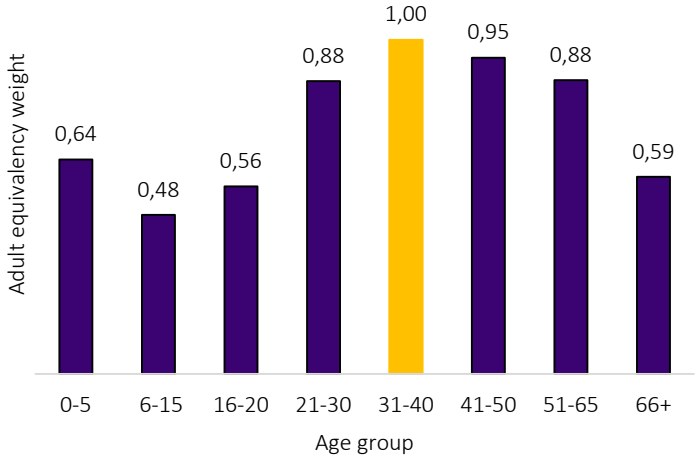
35. Furniture and furnishing, carpets and other floor covering



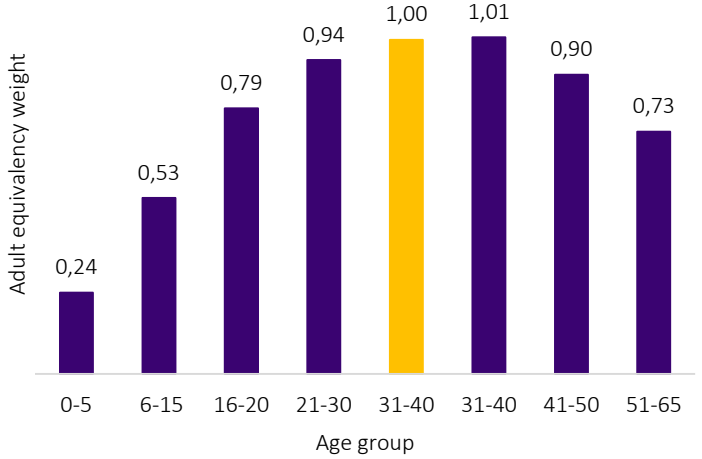
44. Purchase of vehicles



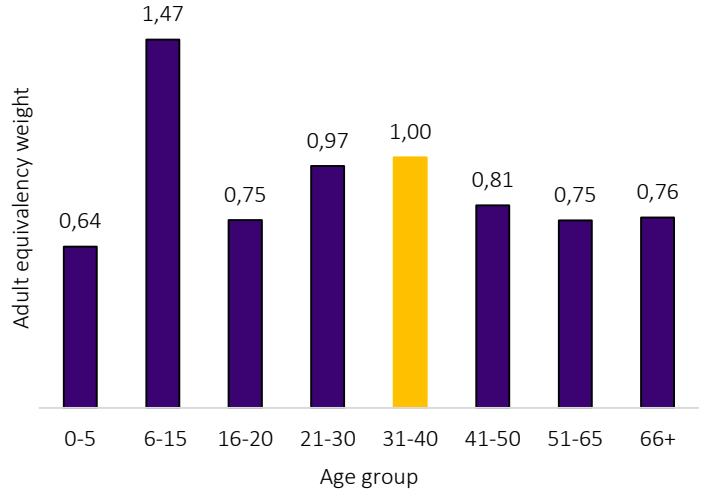
45. Operation of personal transport equipment



49. Telephone and telefax services



53. Recreational and cultural services



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Demographics effects

Cross-section consumption items	place of residence	household size			age of household head		education of household head		socio-economic group of household head				number of income earners	
	village	1	2	5 and above	<35	>55	lower than high school	higher than high school	farmer	pensioner	self-employed	living on unearned sources	1	>2
Grains, cereals and cereal products	+	+	+	-				-	-		+			
Bread	+	+		-			+	-	+		-	-		
Meet	+	-		-		+		-	+	-	+	-		-
Poultry and offal	+			-			+	-	+					
Cold meats	+			-	-	-	+	-		-	-	-		-
Fish and seafood	+		+	-	-		-	+			+			-
Milk and dairy products	+	+	+	-	-				+		+			-
Cheese and eggs	+	+	+	-	-		-	+	+			-	-	
Butter and other animal fats	+		-	-	-	+	-	+	+	+	+	-	+	
Vegetable fats	+	+	+	-			+	-		+	-	+		
Citrus fruits and bananas	+	+	+	-	-		-	+	-		+	-		-
Other fruits and processed fruit	+			-	-		-	+	+		+			-
Potatoes	+			-	+		+	-	+	+	-	+		
Other vegetables and mushrooms	+	+	+	-		+	-				+	-		
Flour, sugar, bakery and confectionery	+			-			-					-		-
Baby foods	+	-	-	-	+	+	+	+	-	-	-	+	-	+
Other food products	+	+	+	-				-	-		+			
Non-alcoholic beverages	-	+	+	-	-		-	+	-	-	+	-	-	+
Alcoholic beverages	-	+	+	-	+		+	-	-	-		-		+
Tobacco	-	+	+	-		+	-	-	+	+		+		

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Demographics effects

Cross-section consumption items	place of residence	household size			age of household head		education of household head		socio-economic group of household head				number of income earners	
	village	1	2	5 and above	<35	>55	lower than high school	higher than high school	farmer	pensioner	self-employed	living on unearned sources	1	>2
Clothes	+					-		+	+	-	+		-	
Men's footwear	-	+	+	-	-	-	-	-	-	-	+	-	-	+
Women's footwear	-	-	-	-		-	-	+	+	-	+	+	-	-
Children's footwear	-		+		-	+	-		-	+	-	-	-	-
Shoe repairs	-	+	+	-	-	-	-	+	-	-	-	-	+	+
Actual rentals for housing	+	+	+	+	-	+	-	-	-	-	-	-	+	+
Maintenance and repair of the dwelling	+	-	-	-	+	+	+	-	+	+	+	-	+	+
Water supply and miscellaneus services relating to the dwelling	-	+	+	-	-	+	-	+	-	-	-	-	-	+
Electricity, gas and other fuels	+	-	-	+	+	+	+	-		-	-	-	+	+
Furniture and furnishing, carpets and other floor covering	-	-	-	+		+	-	-	+	+	-	-	+	-
Household textiles	+	-	-	+	-	+	+	-	-	+	-	-	+	+
Household appliances														
Glassware, tableware and household utensils	-	-	+	-		+	-	+	+	+	-	-	-	+
Tools and equipment for the garden	+	+	+	-	+	+	+	+	+	-	-	-	-	-
Cleaners and services related to running a household	+	+	+	-	-			+			+		-	
Pharmaceutical and medical products, therapeutic equipment	-	+		-			+	+		+			-	+
Out-patient services	-	+	+	+	+	+	-	-	-	+	-		-	+
Hospital services	+	-	-		+	-	+	-	+	+	-		-	
Purchase of vehicles	+	-	-		+	-	+	-	+	+	-	-	+	+
Operation of personal transport equipment	+	-	-	-		-	-	+	-	-		-	-	
Transport services	-	+	+	+	+	+	-	+	+	+	-		+	+

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Demographics effects

Cross-section consumption items	place of residence	household size			age of household head		education of household head		socio-economic group of household head				number of income earners	
	village	1	2	5 and above	<35	>55	lower than high school	higher than high school	farmer	pensioner	self-employed	living on unearned sources	1	>2
Postal services	-	-	+	+		-	-	-	-	-	-	-	+	-
Telephone equipment	-	+	+	+	-	-	+	-	-	-	-	-	+	+
Telephone and telefax services	-	+	+	-	-	+	-	+	-	-	+	-	-	+
Audio-visual, photographic and information processing equipment	-	-		+	+	-					+			-
Other major durables for recreational and culture														
Games, toys, sports equipment	+	-	+	-	+	+	-	+	-	-	+	-	+	+
Recreational and cultural services		+	+	-	-			+			+	-		
Newspapers, books and stationery	-	-	-	+	-	-	-	+	+	-		+	-	-
Package holidays	-	-	+	-	+	-	-	+	-	-	+		+	-
Pre-primary and primary education	-	-	-	+	-	-	-	+	-	-	+		-	-
Secondary and post-secondary non-tertiary education	-	-	-	+	-	-	-	-	-	-	-	-	-	+
Tertiary education	-	-	-	+	-	-		+	+		+		-	-
Education not definable by level														
Catering services	-	-	-	+	-	-		+	-	-		-	-	
Accommodation services	+	+	+		+	+	-		+	+			-	-
Hairdressing services	-	+	+	-	+	+	-	-	+	-	-	-	+	+
Cosmetics, hygiene products and personal care appliances	-	+	+	-	+			+	-	-	+	-		+
Silverware, jewelry, other personal effects	-	-	-	+	+	-		+	+	-	+	+	+	+
Articles for children														
Care for children and the elderly	-	+	-		+		+	+		+	+	-	-	-
Insurance	+	+	+	-	-	+	-	-	+		+	-	-	+
Financial services														
Funeral services	-	+	+	-	+	-	+	+	+			+	-	+
Prostitution and other services	-	-	-	+	+	-	+	-	+	-	-	-	+	-

Further works

Further purposes:

- Improve result for cross-section estimation: more periods, alternative estimation techniques?
- Cohort analysis and the estimation of cohort effects.
- Time-series aggregation and PADS (Perhaps Adequate Demand System) estimation.