Big data analysis of impact of the crisis on consumption and production in Mongolia

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Background information on big data

- **Individuals and households from HSES -2021 data**

- **Administrative data on food stamp receiving households**

- **Firms' data from Enterprise Census-2021**

- **VAT data 2018- June 2022 on individuals and firms**

- **Matching them using individuals' RN and enterprises' RN.**

- **The VAT records in Mongolia is big data:**

  - **in terms of volume (a large quantity of data),**

  - **variety (multiple types of data and unstructured data),**

  - **velocity (the speed at which data is created)**

thus meets the definition of big data by being automatically generated through the process of consumers and businesses making transactions

Total number of receipts printed monthly from VAT system, million per month
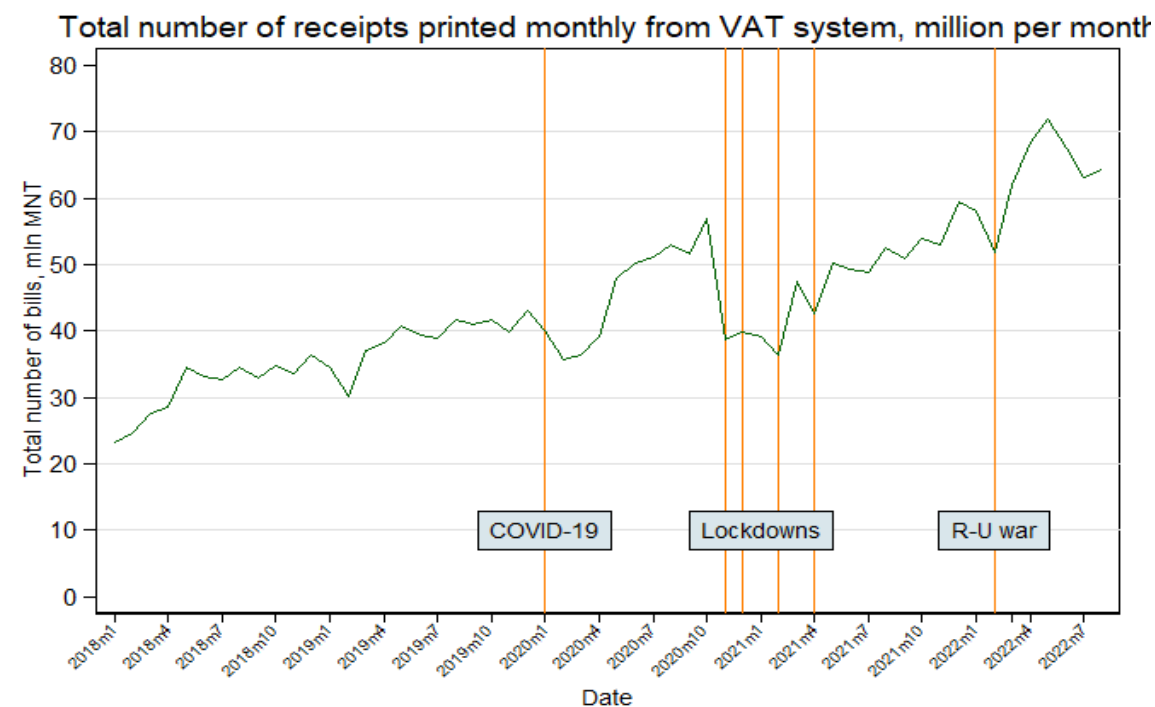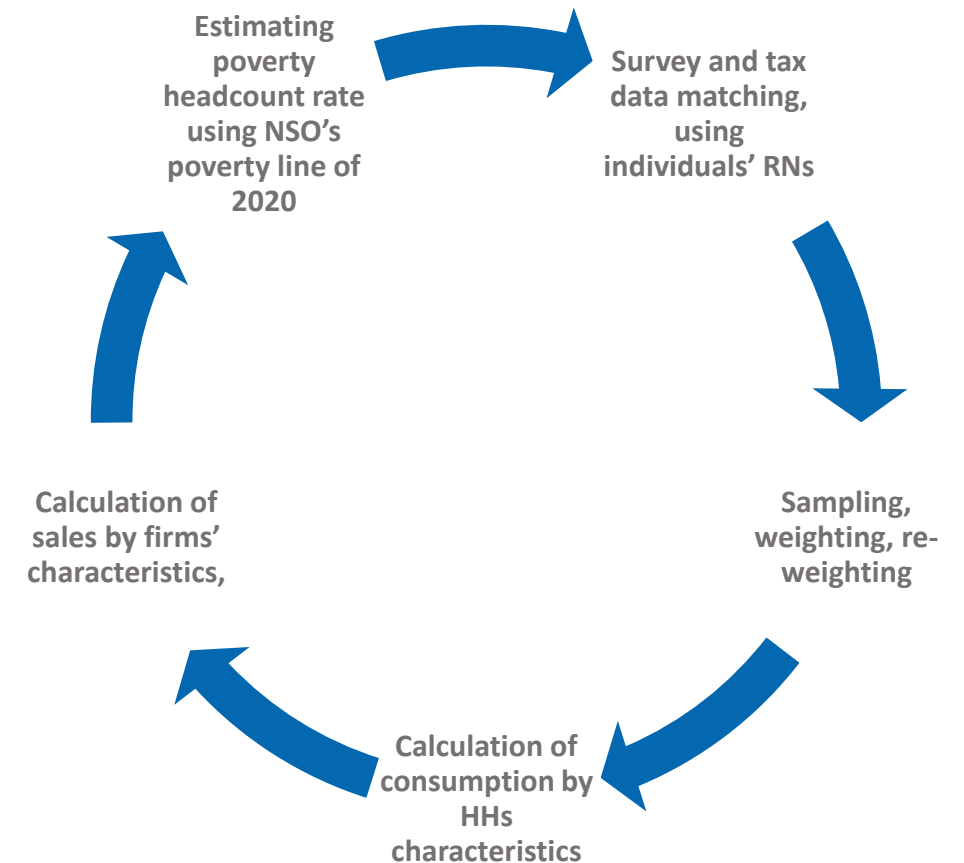
Research questions

How did the total consumption and categories of consumption change in 2021 and 2022 (the first half period) at household level in Mongolia?

What are the differences in consumption depending on the household head's gender, location, and income levels, especially for households who receive food stamps?

What is correlation between household expenditure and the war in Ukraine?

What is correlation between firms' sales and the war in Ukraine?

How did poverty in terms of expenditure changed over the 2021-2022 at the household and individual level?

Estimating poverty headcount rate using NSO's poverty line of 2020

Survey and tax data matching, using individuals' RNs

Sampling, weighting, re-weighting

Calculation of consumption by HHs characteristics

Calculation of sales by firms' characteristics,

Data: Share of households registered in VAT system

- **Population sampling is households in HSES-2021 is 11,199 households.**

- **VAT system coverage is increasing**

- **As of 2021, 78.7% of all households are registered at least one receipt in VAT system**

- **88.3% of HHs in UB and 53.5% of HHs countryside**

- **Most of food stamp receiving households are registering in VAT system.**

Share of all households

Year	Total	UB	Aimag center	Soum center	Country-side
2018	**60.3%**	75.7%	67.9%	47.3%	28.0%
2019	**66.5%**	79.7%	73.7%	54.9%	38.6%
2020	**74.0%**	83.9%	80.4%	66.7%	50.8%
2021	**78.7%**	**88.3%**	**84.3%**	**72.0%**	**56.9%**

Food stamp receivers

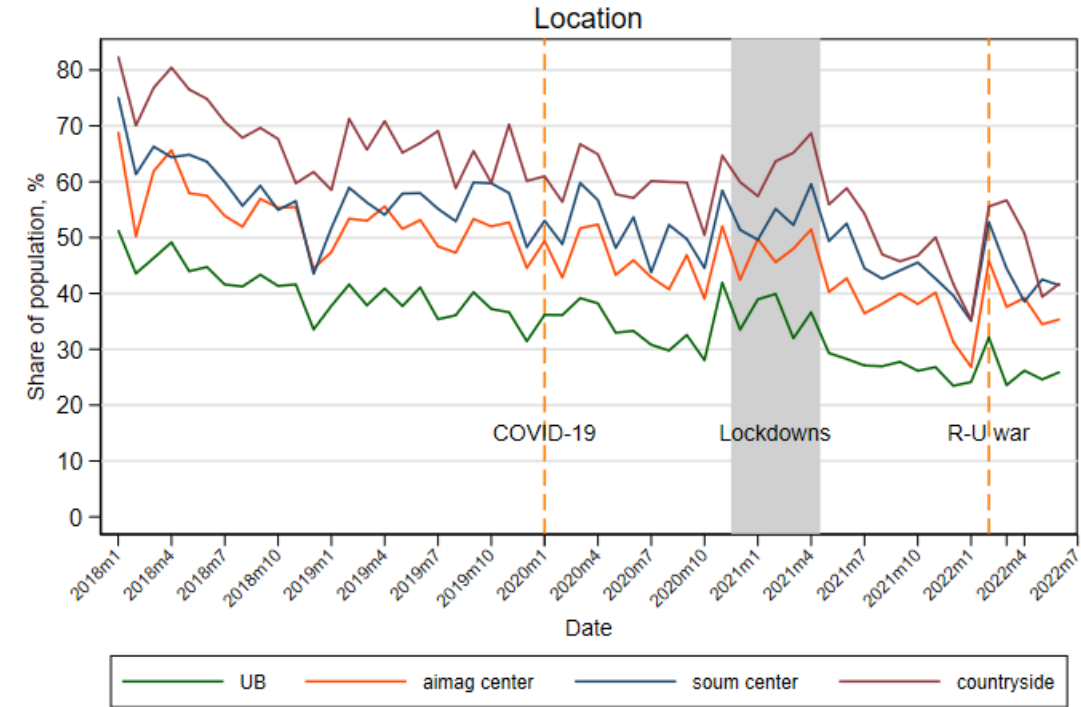| Year	2018	2019	2020	2021
Share of FS households registered in VAT system	38.2%	47.8%	61.5%	70.0%

The general trend in household expenditures measured at the VAT system

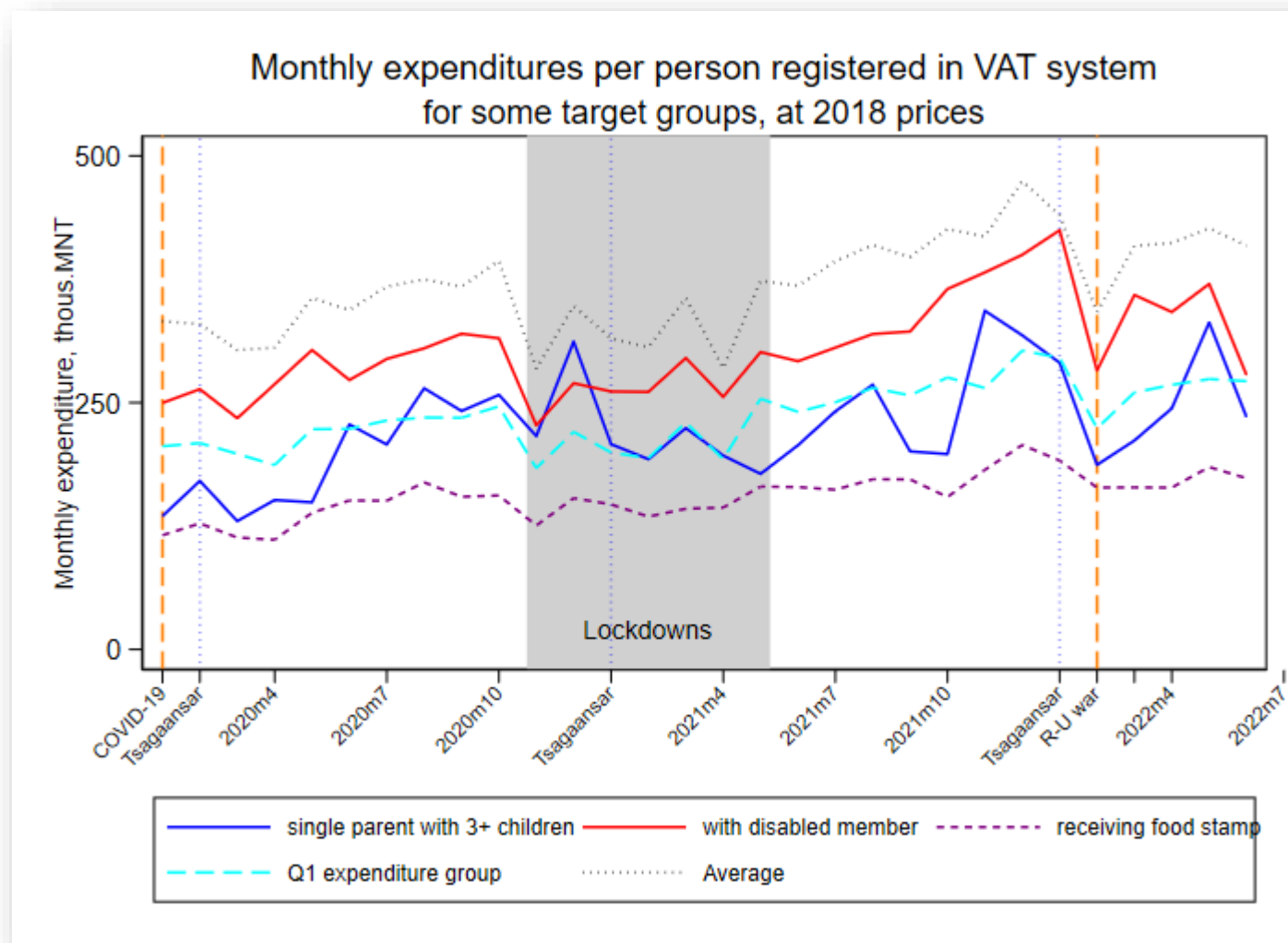Monthly expenditures per person registered in VAT system at 2018 prices
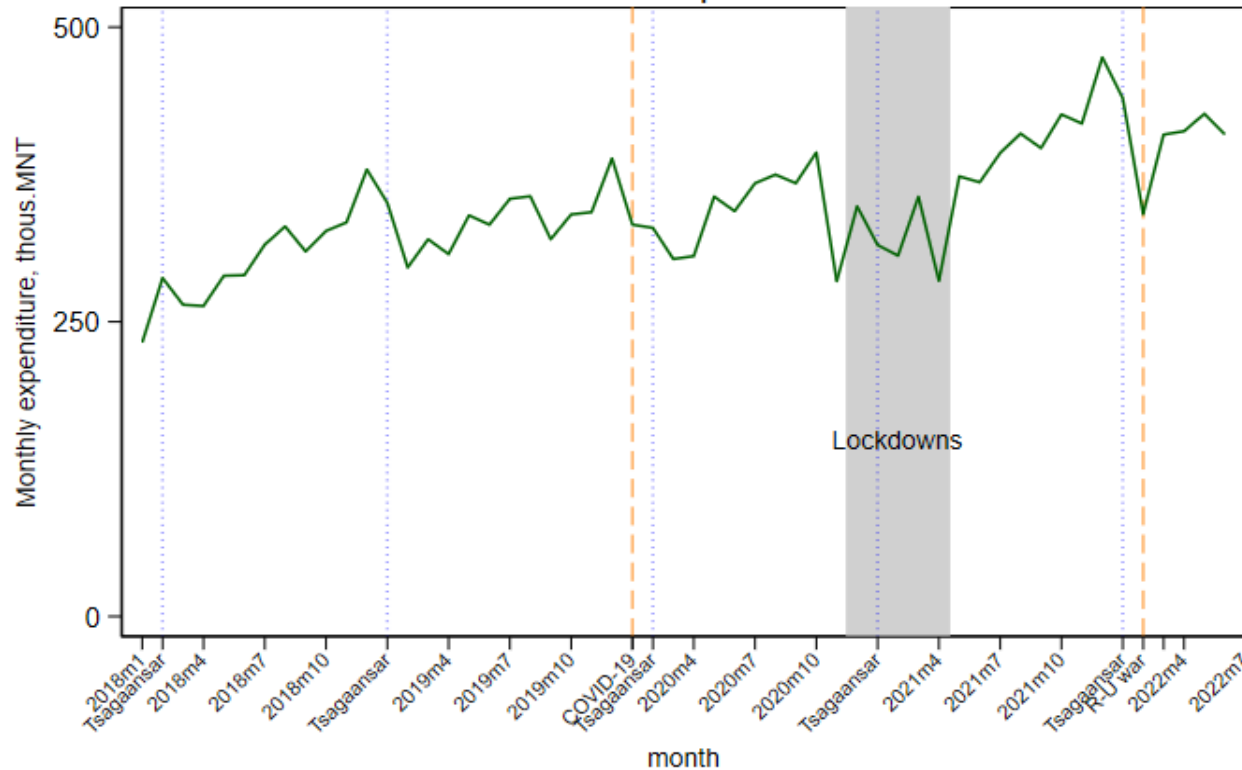
Share of population VAT spending is under the poverty line, %

Share of population whose spending registered in VAT system is lower than the poverty line decreased for last years.
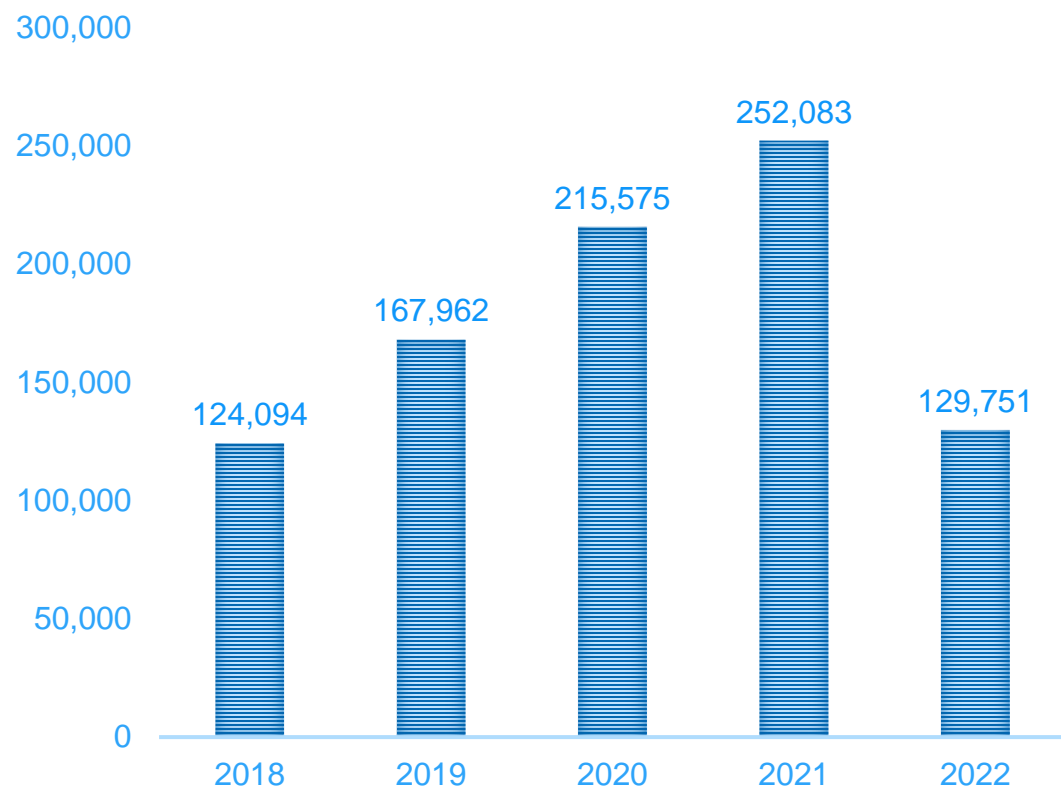
Household expenditures measured at the VAT system

- **Consumption of Food stamp beneficiaries is much less than other**

- **Before Covid, consumption of single parents with 3+ children was less than that of the poorest quintile.**

- **After the increase in Child money, consumption of this group was close to that of Q1**

- **In June 2022, consumption of target groups contracted more**

Monthly expenditures per person registered in VAT system for some target groups, at 2018 prices
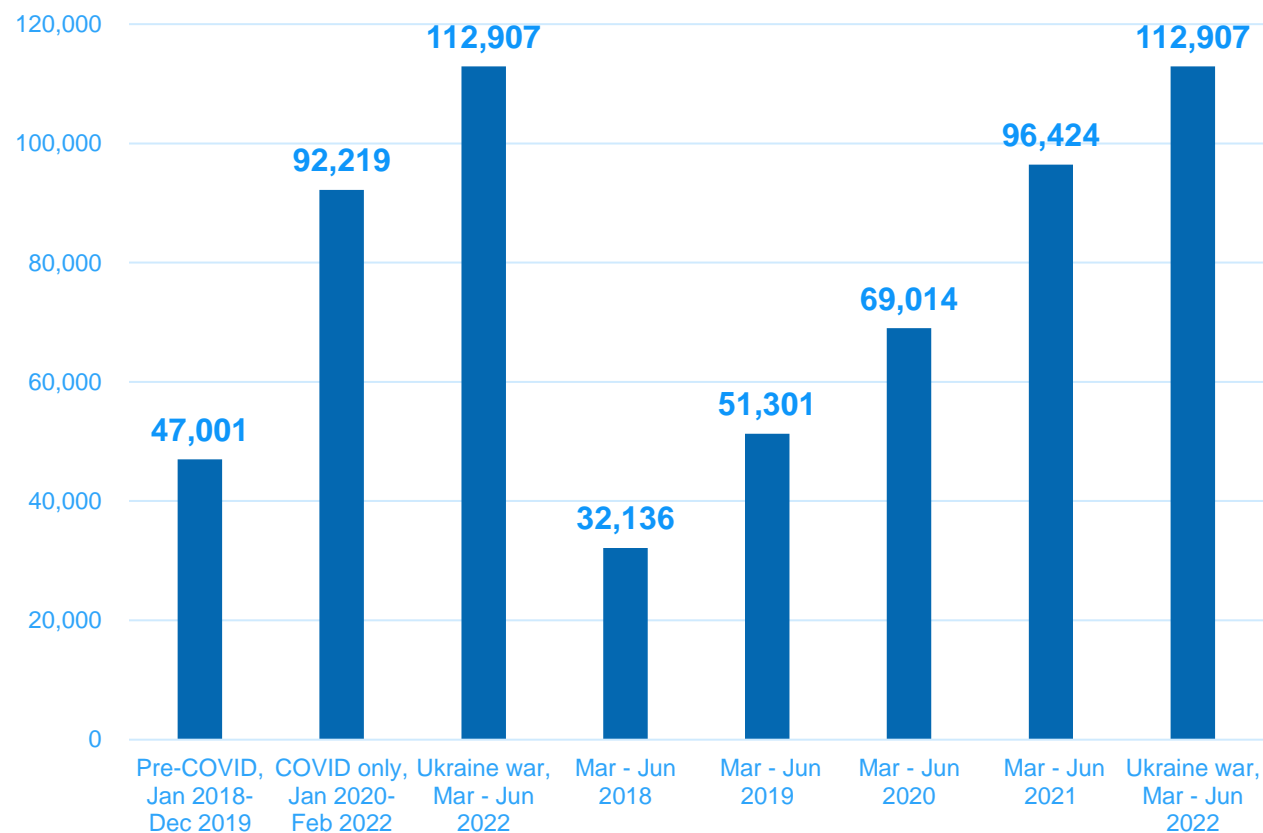
Household expenditures measured at the VAT system

NUMBER OF PURCHASES REGISTERED AT VAT SYSTEM BY FS HHS
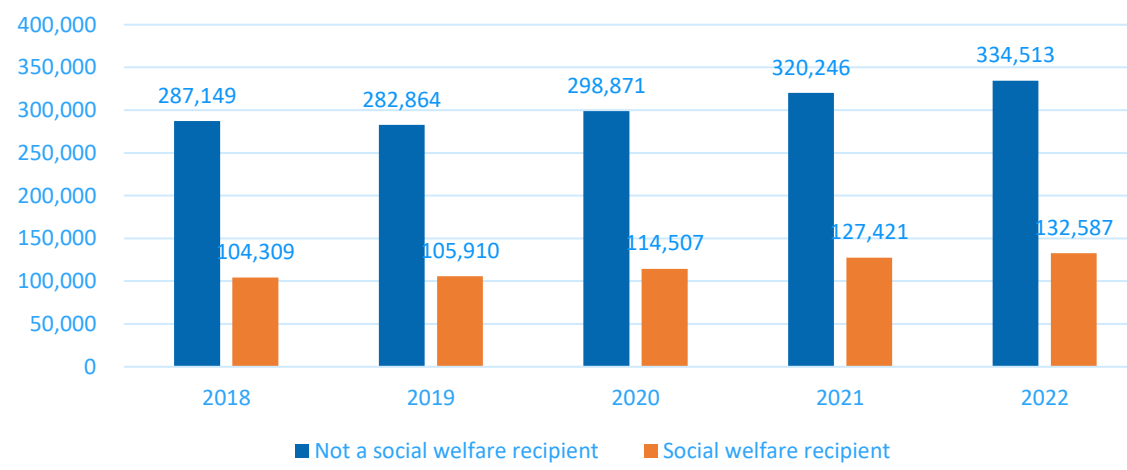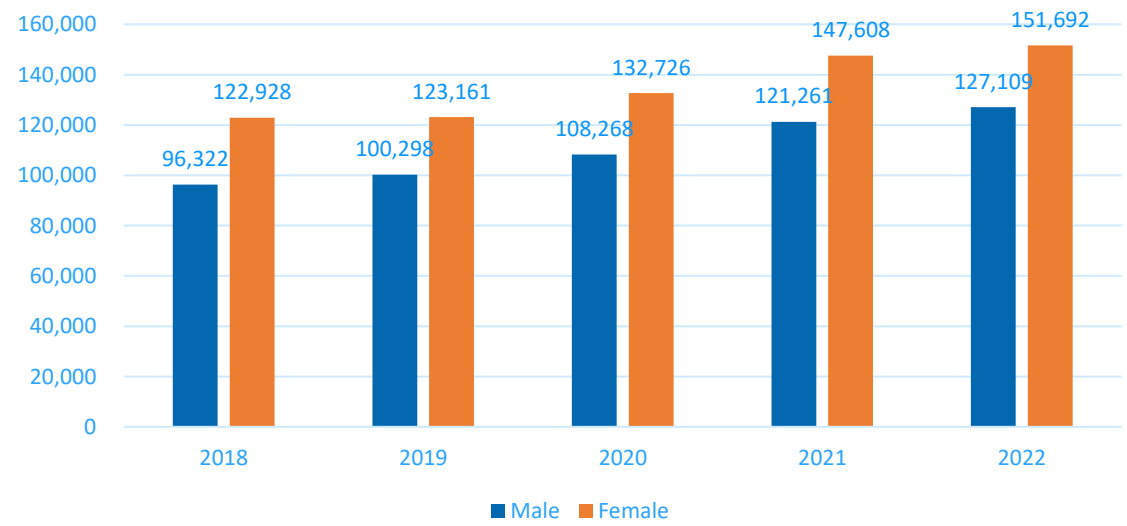

- 2018: 124,094
- 2019: 167,962
- 2020: 215,575
- 2021: 252,083
- 2022: 129,751

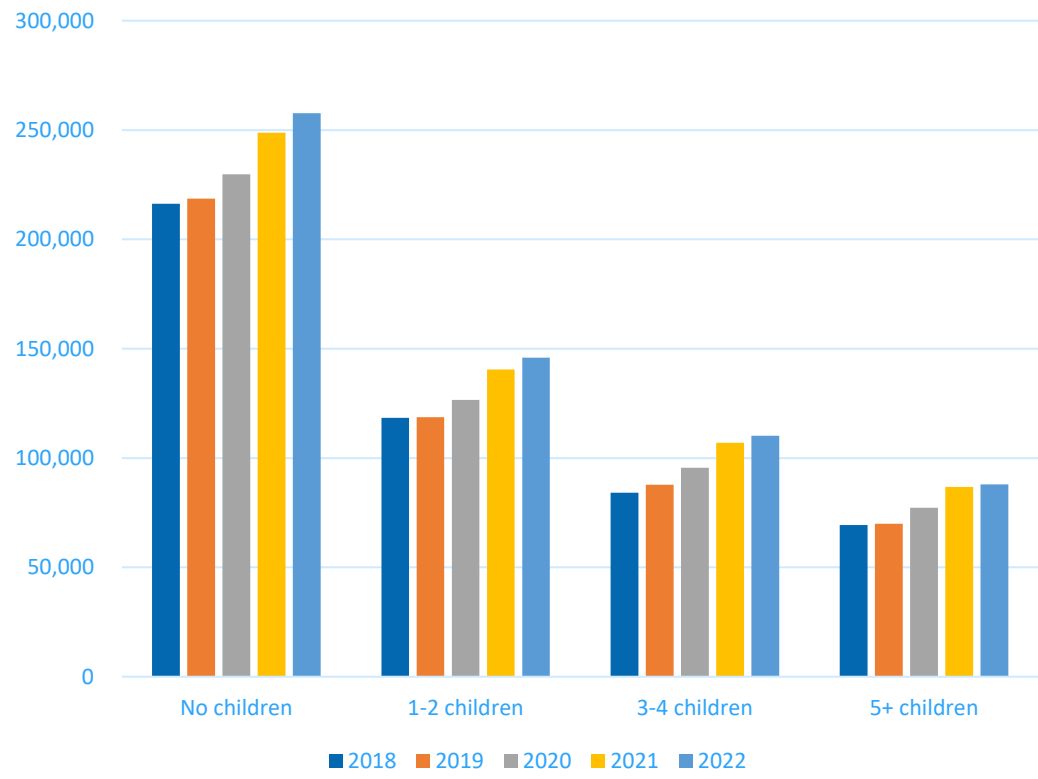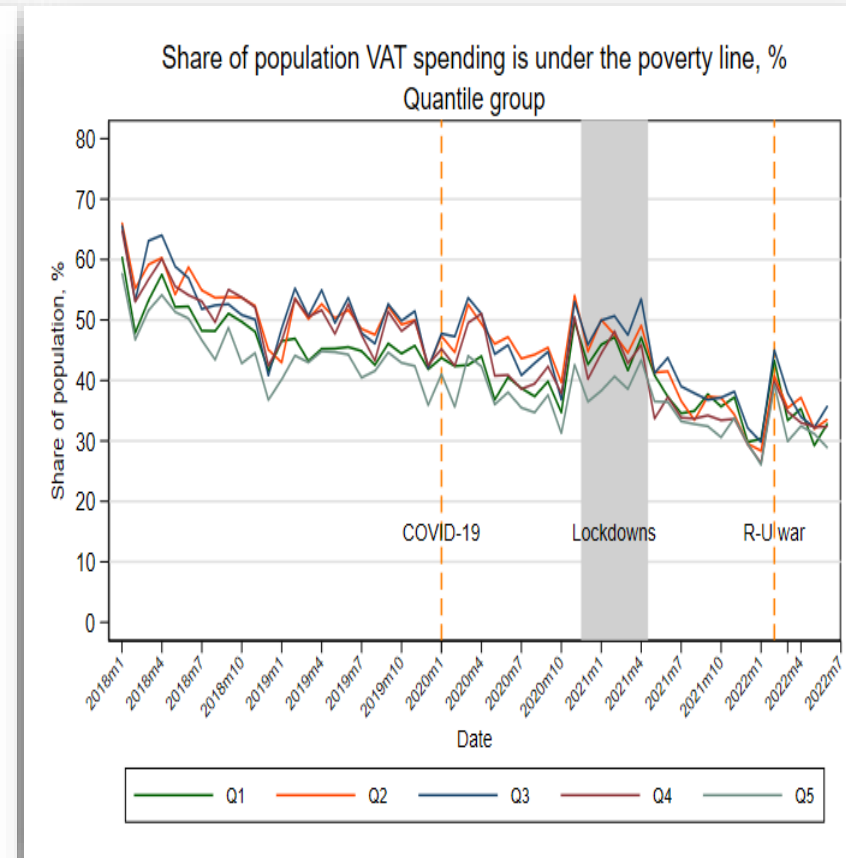## MEAN MONTHLY PURCHASE PER PERSON (in 2018 prices)

- Pre-COVID, Jan 2018-Dec 2019: 47,001
- COVID only, Jan 2020-Feb 2022: 92,219
- Ukraine war, Mar - Jun 2022: 112,907
- Mar - Jun 2018: 32,136
- Mar - Jun 2019: 51,301
- Mar - Jun 2020: 69,014
- Mar - Jun 2021: 96,424
- Ukraine war, Mar - Jun 2022: 112,907

Household expenditures measured at the VAT system

Monthly average VAT purchase per person (in 2018 prices)

Categories: No children, 1-2 children, 3-4 children, 5+ children
Legend: 2018, 2019, 2020, 2021, 2022

Male / Female

Year	Male	Female
2018	96,322	122,928
2019	100,298	123,161
2020	108,268	132,726
2021	121,261	147,608
2022	127,109	151,692

Not a social welfare recipient / Social welfare recipient

Year	Not a social welfare recipient	Social welfare recipient
2018	287,149	104,309
2019	282,864	105,910
2020	298,871	114,507
2021	320,246	127,421
2022	334,513	132,587

Trends in poverty headcount rate

Share of population VAT spending is under the poverty line, %

Share of population VAT spending is under the poverty line, %
Head's gender

Share of population VAT spending is under the poverty line, %
Quantile group

Trends in poverty headcount rate

Poverty headcount rate, by region (from 2018 to 2022.H1)

	Chronic and Persistent	Chronic but not persistent	Transient poor	Never poor	Total
Total	10.6%	12.8%	25.1%	51.5%	100.0%
West	23.5%	19.5%	25.7%	31.3%	100.0%
Khangai	14.3%	16.8%	29.1%	39.8%	100.0%
Central	11.1%	15.3%	27.8%	45.8%	100.0%
East	11.3%	13.3%	25.6%	49.8%	100.0%
UB	7.2%	9.7%	23.1%	60.0%	100.0%

By location

	Chronic and Persistent	Chronic but not persistent	Transient poor	Never poor	Total
Total	10.6%	12.8%	25.1%	51.5%	100.0%
UB	7.2%	9.7%	23.1%	60.0%	100.0%
Aimag center	13.0%	15.6%	26.7%	44.7%	100.0%
Soum center	14.6%	14.8%	29.1%	41.5%	100.0%
Countryside	20.5%	21.0%	28.4%	30.1%	100.0%

by household head's gender

	Chronic and Persistent	Chronic but not persistent	Transient poor	Never poor	Total
Total	10.6%	12.8%	25.1%	51.5%	100.0%
Male	11.4%	13.6%	26.3%	48.6%	99.9%
Female	7.5%	9.9%	20.7%	61.9%	100.0%

By household head's employment status

	Chronic and Persistent	Chronic but not persistent	Transient poor	Never poor	Total
Total	10.6%	12.8%	25.1%	51.5%	100.0%
Employed	10.9%	13.7%	26.3%	49.2%	100.1%
Not employed	10.0%	11.0%	22.8%	56.2%	100.0%

By number of children

	Chronic and Persistent	Chronic but not persistent	Transient poor	Never poor	Total
Total	10.6%	12.8%	25.1%	51.5%	100.0%
1	7.7%	12.3%	27.0%	53.0%	100.0%
2	11.7%	15.7%	29.5%	43.1%	100.0%
3	21.4%	20.0%	27.0%	31.7%	100.1%
4+	30.2%	23.5%	26.8%	19.6%	100.1%
No child	4.9%	6.8%	19.7%	68.6%	100.0%

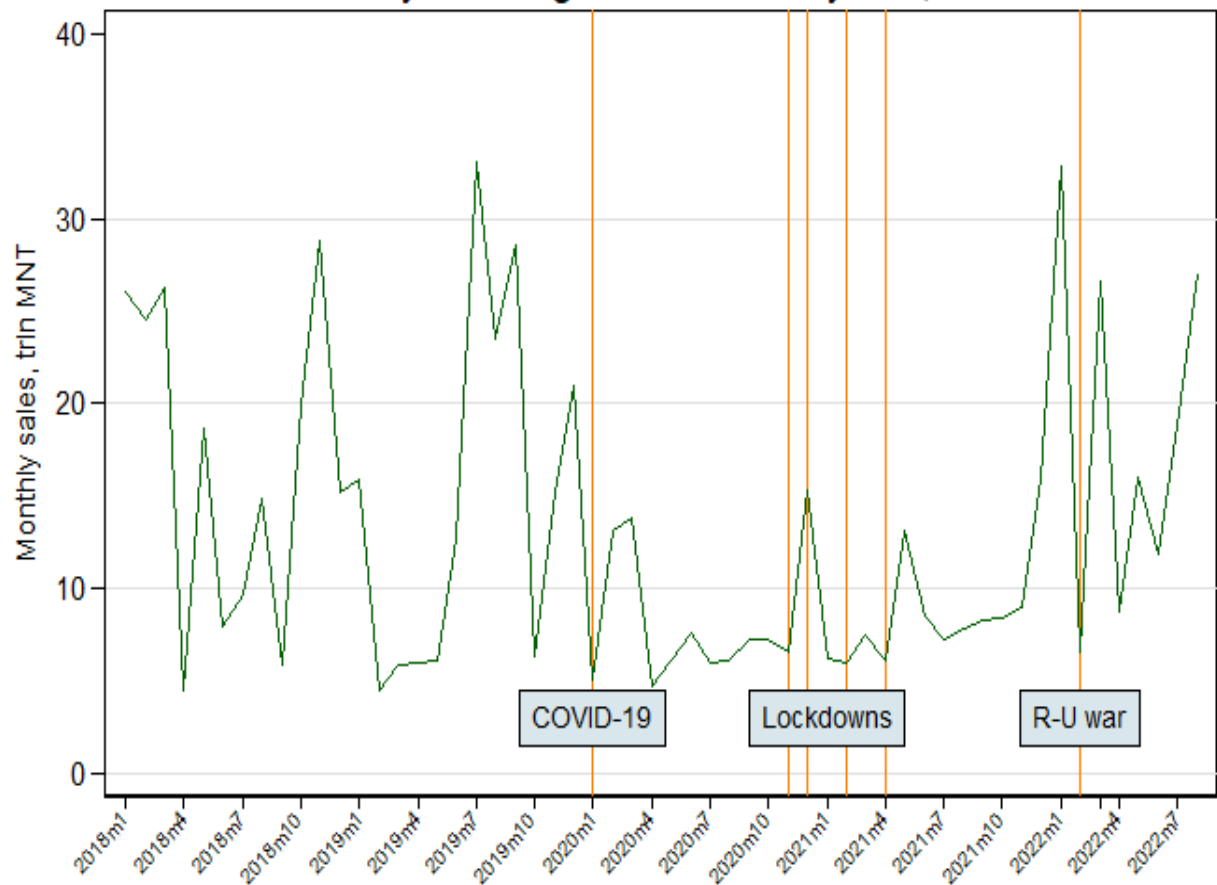# Economic Mobility in terms of per person, per month expenditure

UNDP

- **The advantage of the VAT big data is ability to observe economic mobility of households in the medium and long run**

- **Middle income households' mobility is both directions (upward and downward) in 2018-2022**

- **Upper middle income households' economic mobility was much stable in 2018-2022.**

- **Lower income households' economic mobility was more upward rather than downward in 2018-2022.**

Quintile groups in 2022

		Q5	Q4	Q3	Q2	Q1	Total
Quintile groups in 2018	Q5	60.8	20.1	9.5	5.2	4.3	100%
	Q4	20.8	36.3	22.1	13	7.8	100%
	Q3	11.7	22.7	27.5	22.8	15.4	100%
	Q2	4.6	13.8	24	30.8	26.8	100%
	Q1	2.1	7.1	16.9	28.1	45.8	100%

Mobility across expenditure groups, 2018-2022

UNITED NATIONS DEVELOPMENT PROGRAMME
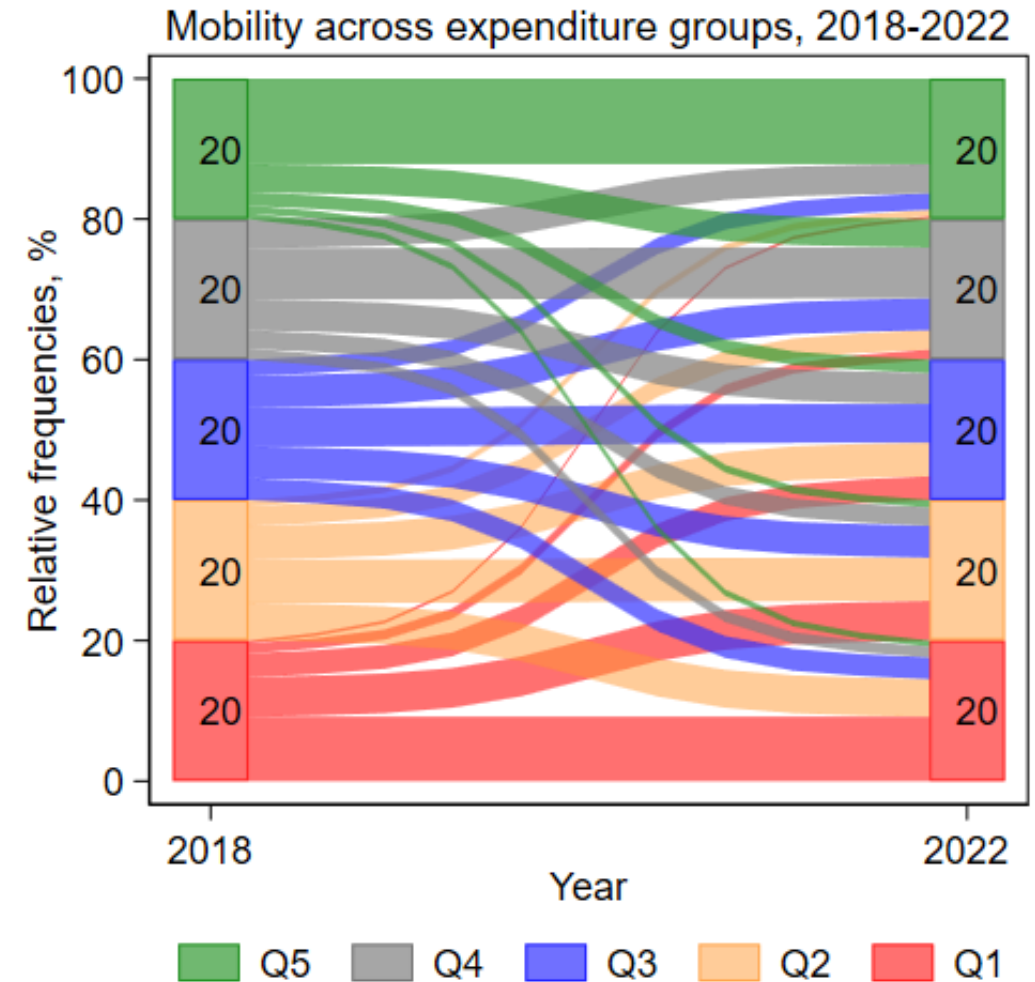
How firms' sales have changed 2018- June 2022
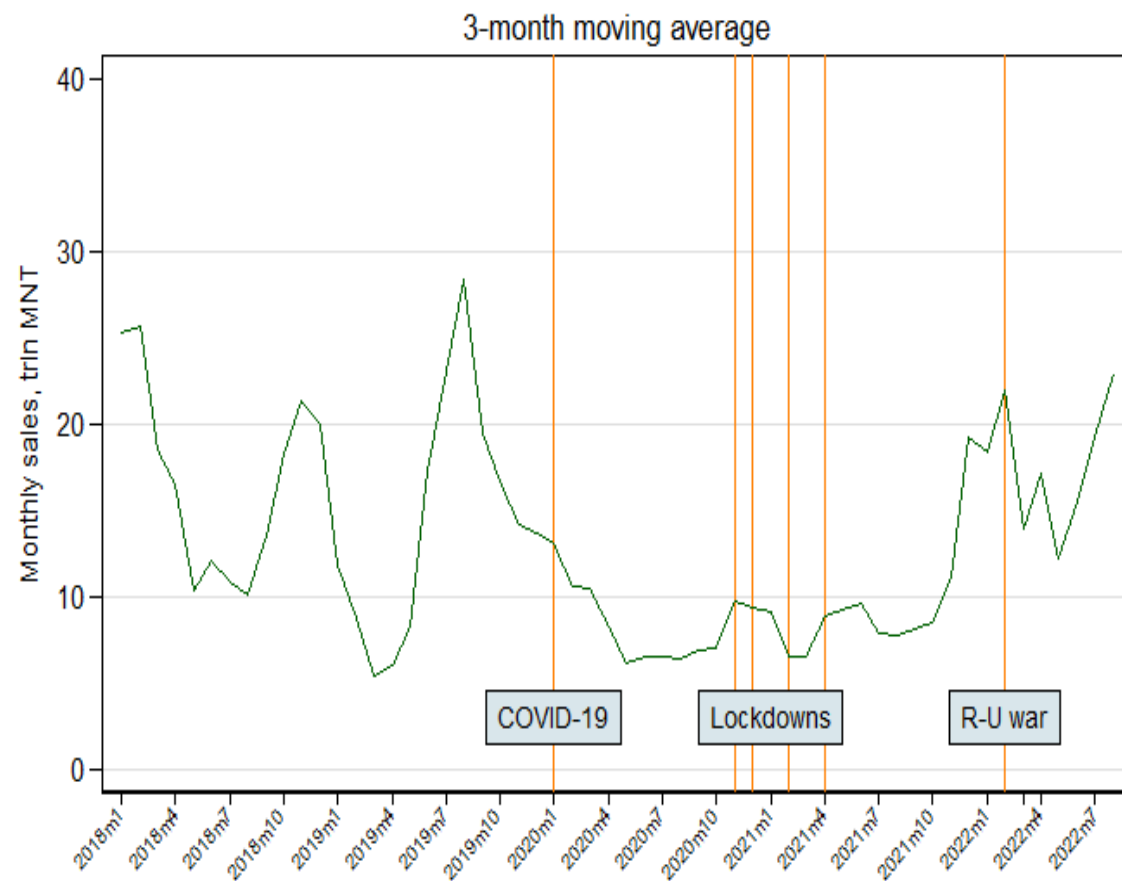
The most affected sectors?

Total sales by categories

Legend:
- Clothes
- Entertainment
- Public
- Health
- Education
- Leisure
- Communication
- Non-food
- Food
- Transport
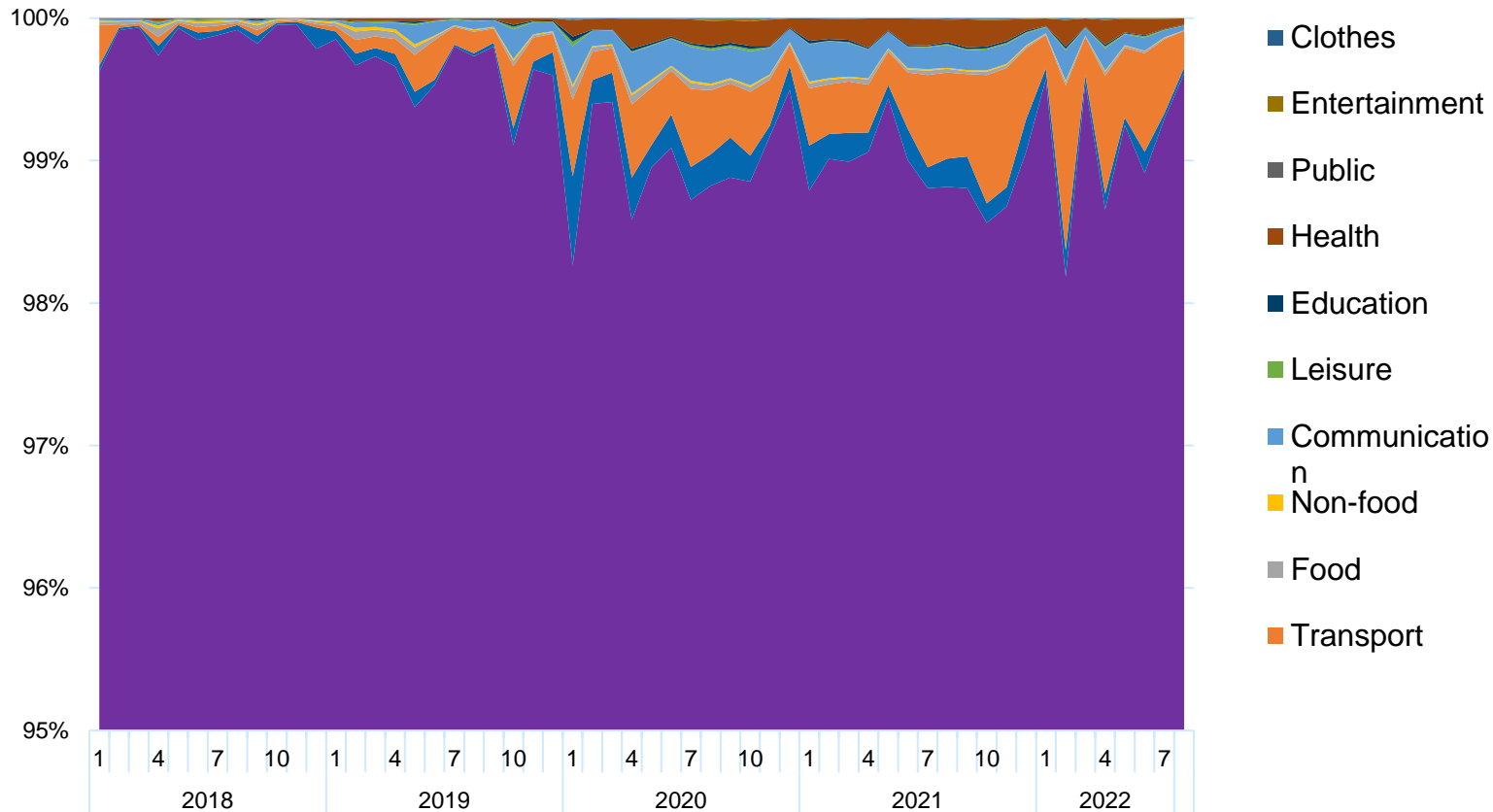
- There are 12 categories in VAT recording.
- 90% VAT records in the category of: others
- Sales in imported petroleum had declined in March-May 2022
- Hard to distinguish the impacts of the triple triggers:
1. Covid-19 in 2022
2. VAT lottery suspension
3. The war in Ukraine
- Hard to conclude.

Preliminary conclusion

- VAT system coverage is increasing.

- In 2021, 78.7% of all households are registered at least one receipt in VAT system.

- Most of food stamp receiving households are registering in VAT system.

- Share of population whose spending registered in VAT system is lower than the poverty line decreased for last years.

- Middle income households' mobility is both directions (upward and downward), upper middle income households' was much stable, lower income households' mobility was more upward in 2018-2022.

- The total monthly sales VAT records have declined sharply in March-May, 2022 and recovered since late May, 2022.

- Hard to distinguish the impacts of the triple triggers:

1. Covid-19 in 2022

2. VAT lottery suspension in 2022

3. The war in Ukraine starting from February 2022.