Climate Change, COVID-19 and Household Energy Consumption

CAREC Chai VI: Supporting Regional Actions to Address Climate Change

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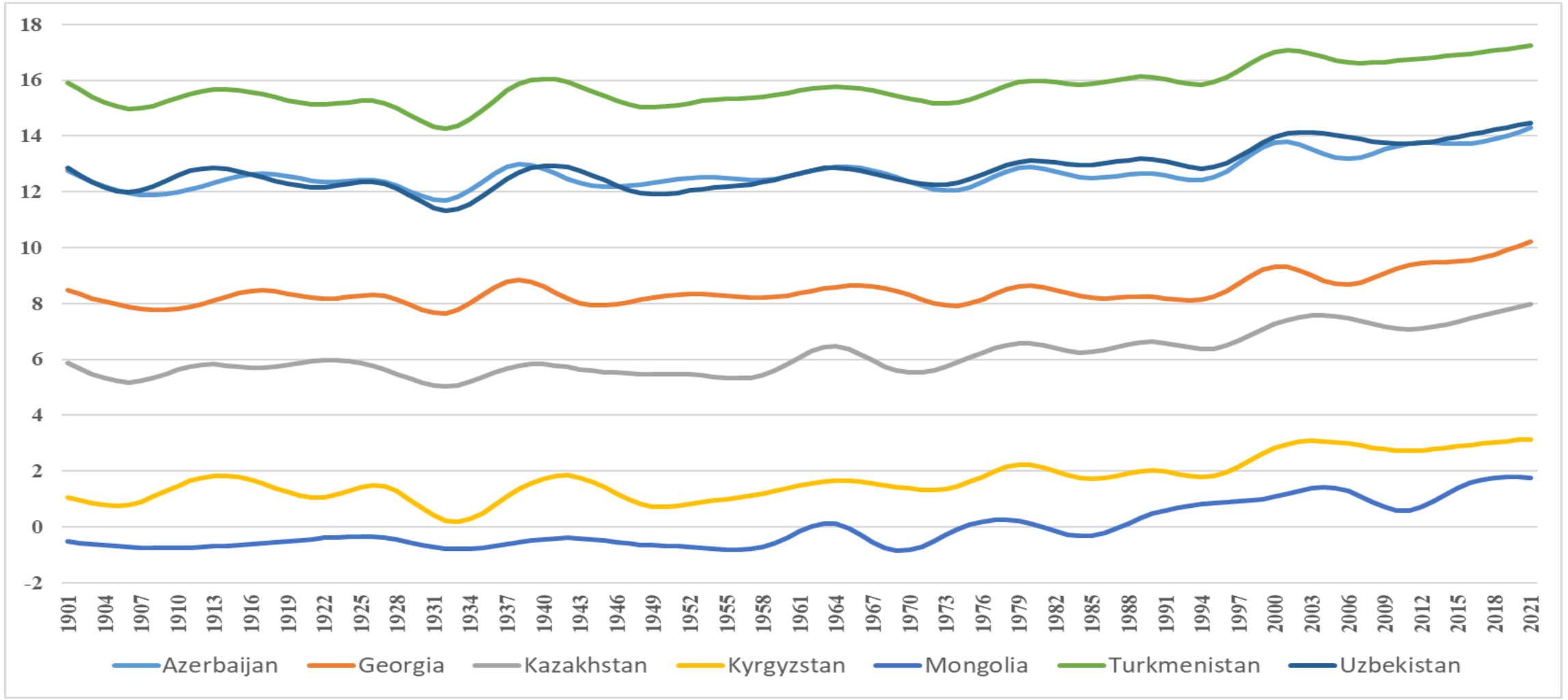
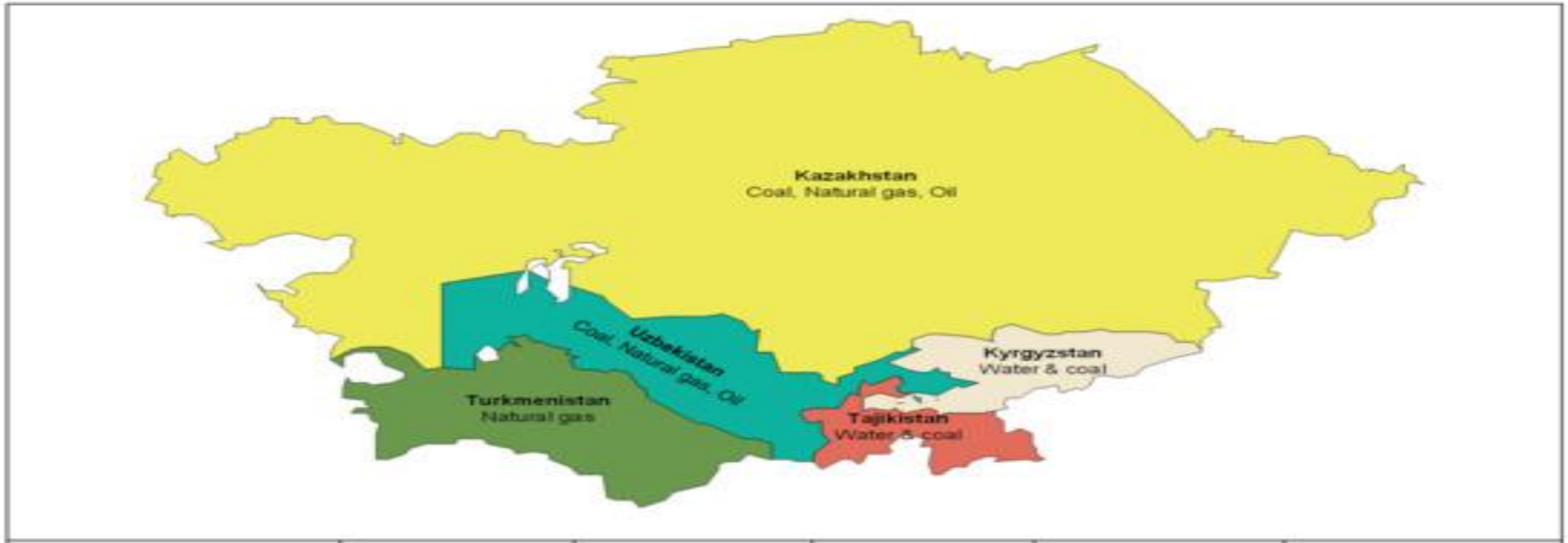
Observed average annual mean-temperature (5year smooth, 1901-2021)



Source: https://climateknowledgeportal.worldbank.org/

Main energy resources in Central Asia



Resources	Kazakhstan	Kyrgyzstan	Tajikistan	Uzbekistan	Turkmenistan
Coal (bt)	31.3	0.9	3.6	3.3	-
Natural Gas (tcm)	2.4	0.006	0.006	1.8	7.5
Oil (bb)	30	0.04	0.01	0.594	0.6
Hydro (GW)	20	26	40	1.7	-

Source: Mehta et al. (2021) The Energy Situation in Central Asia: A Comprehensive Energy Review Focusing on Rural Areas

Climate change and energy consumption nexus

- Climate change challenges:
  - 30% decrease in glacier surface area in Central Asia over the past 50-60 years as a result of changing climate conditions (ADB, 2022)
  - The melting of snowcaps combined with intensifying weather events (frequent floods and landslides)
- Growing residential energy consumption and required energy generations for sustainable growth
  - Energy demand in the CAREC region (excluding the PRC) will grow by more than 30% by 2030 (ADB, 12 January 2023)
- Transition to clean energy requires reduction of carbon emissions and increase of clean fuel consumption

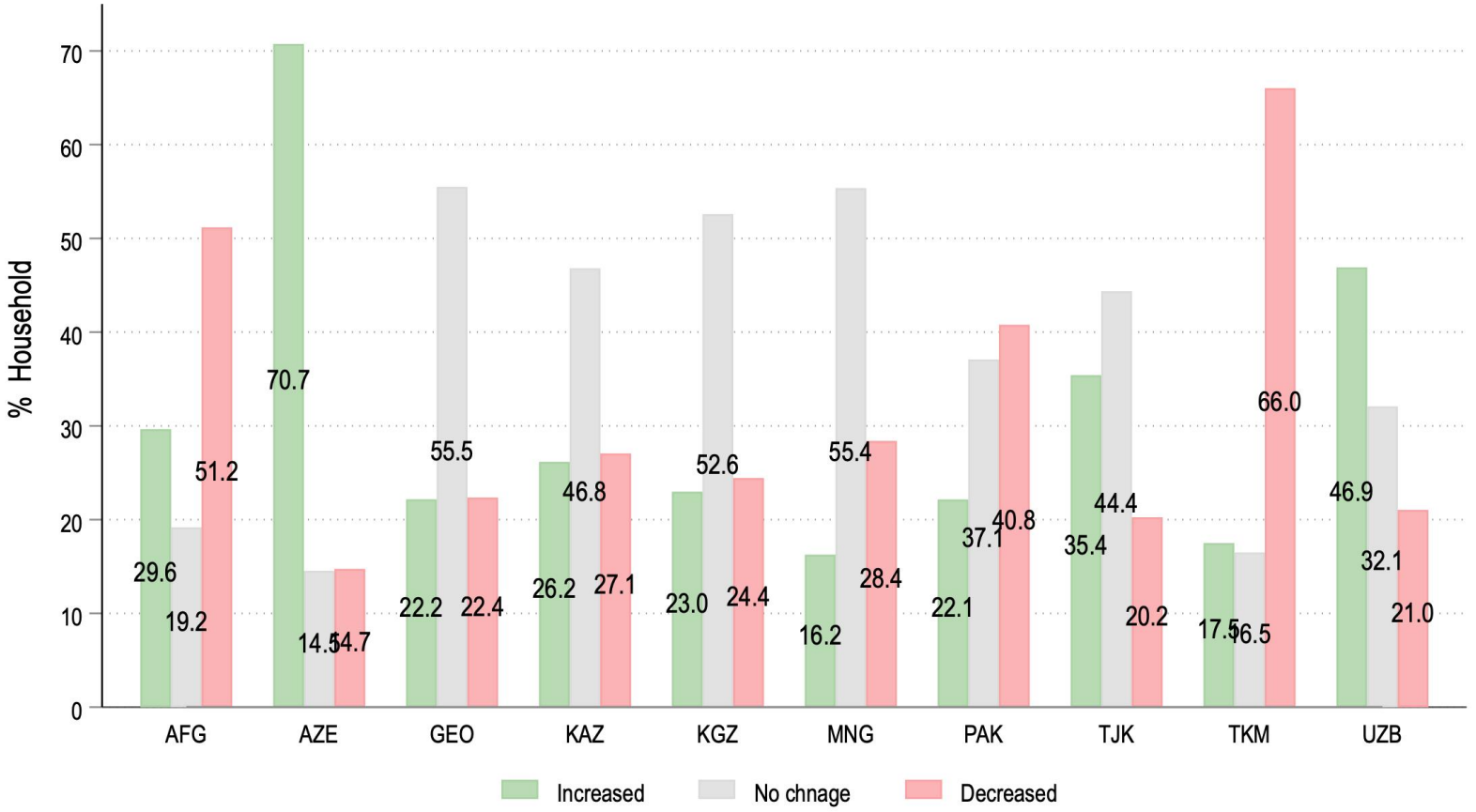
https://www.adb.org/news/features/five-things-know-about-future-energy-central-asia

Challenges for green growth

- Modernizing energy infrastructure for energy efficiency
- Improving the energy security of Central Asian countries require the introduction of additional capacities from renewable energy sources
- Significant investments in renewable energy are needed
- Encourage of private investments in green energy sources
- Transition to clean energy should be accompanied with relatively stable income of households
- Income volatility in the aftermath of COVID-19 and geopolitical situation

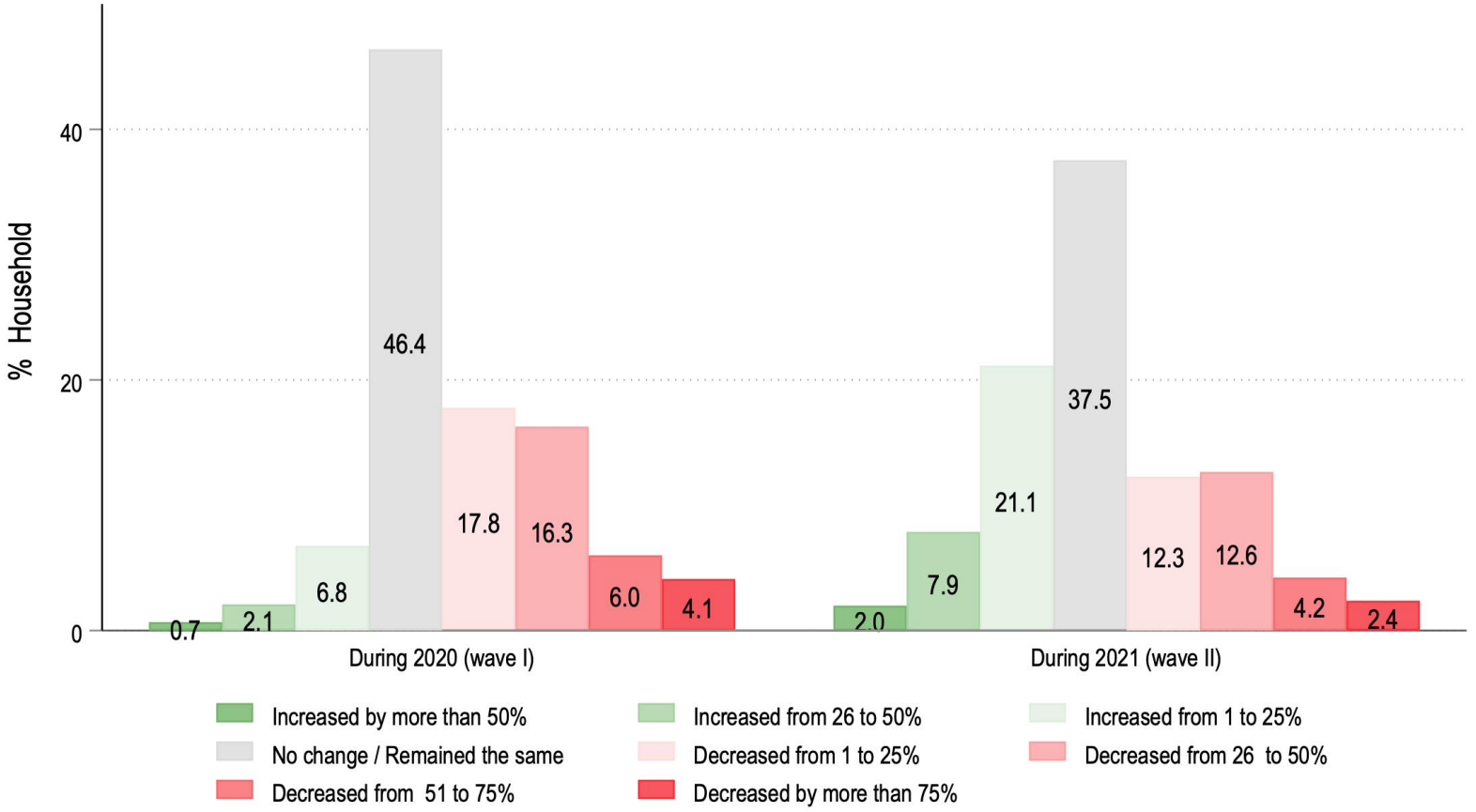
ADBI household survey in the CAREC region

Country comparison: Change in monthly household income during 2021 (wave II)

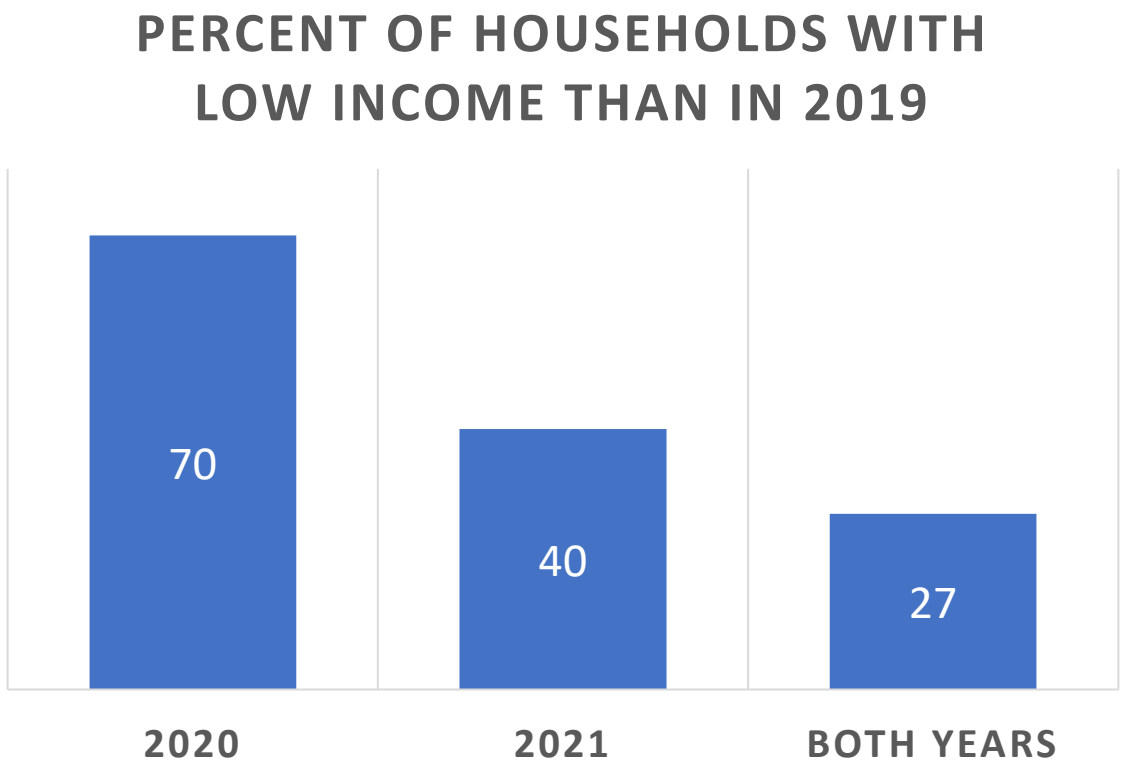


ADBI household survey in the CAREC region

Change in household expenditure during 2020 (wave I) vs. during 2021 (wave II)



Evidence from Kyrgyzstan Integrated Household Survey data (2019-2021)



- Panel data: 2019-2021
- Total sample: 4487 households
- Income is deflated based on the annual CPI by regions
- Income loss is dummy variable indicating 1 if the income is less than in 2019.

Energy consumption trends by income status

Total sampe

	Total energy	Coal	Electricity	Gas	Biomass
2019	1407	1092	646	32	48
2020	1406	1034	693	33	23
2021	1485	1072	716	33	51

Without loss of income

	Total energy	Coal	Electricity	Gas	Biomass
2019	1473	1148	648	32	51
2020	1340	902	691	33	23
2021	1571	1173	705	32	54

Increase

Decrease

Households with loss of income in both years (2020 and 2021)

	Total energy	Coal	Electricity	Gas	Biomass
2019	1229	919	641	33	40
2020	1582	1441	699	34	22
2021	1254	755	747	34	44

- Each energy source is converted into the kilogram of conventional energy (*условное топливо*)
- Energy consumption is expressed in per capita terms
- Biomass includes dung, corn bud, wood, bruswood

Energy consumption trends by location

Urban households

	Total energy	Coal	Electricity	Gas	Biomass
2019	1046	521	742	52	19
2020	1207	779	791	54	5
2021	1286	865	809	52	21

Rural households

	Total energy	Coal	Electricity	Gas	Biomass
2019	1884	1488	521	7	87
2020	1668	1212	563	7	46
2021	1748	1220	593	7	91

Preliminary empirical results: Difference-in-differences

	Total energy	Coal	Electricity	Biomass	Gas
Total sample	172.835	260.631	11.663	4.927**	0.579
	(283.533)	(470.918)	(7.876)	(2.121)	(1.095)
Urban	-133.739	-296.067	22.142**	2.419	0.283
	(97.565)	(241.758)	(11.178)	(1.654)	(2.696)
Rural	594.404	631.874	-1.411	8.482*	0.636
	(642.888)	(780.524)	(10.436)	(4.448)	(0.852)

Standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.010.

- Interaction variable:

*COVID-19 period * Income decline*

Finding:

- Households that experienced income decline in both years aftermath of COVID-19 consume more biomass (rural) and electricity (urban).

Policy recommendations (based on study on KZ and KG)

- Policies promoting natural gas and LPG infrastructure development will likely reduce the consumption of solid fuels
- Electricity price increase should be done with care due to possibility of switching to coal. Access to affordable clean fuel is important, especially for vulnerable groups.
- power outages are important for choice of cooking fuel by households.
- Household heads with better education are more aware of the impact on the health of indoor pollution caused by traditional fuels (Alem et al., 2016) and hence opt-out of the use of dirty fuel.
- Empowering women as household heads/household decision makers could lead to switch to cleaner fuels.

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Research article

Why energy access is not enough for choosing clean cooking fuels? Evidence from the multinomial logit model

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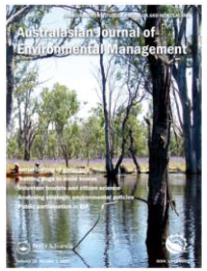

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What determines coal consumption for residential heating in Kazakhstan and the Kyrgyz Republic?

Dina Azhgaliyeva, Ranjeeta Mishra, Kamalbek Karymshakov, Aiymgul Kerimray & Zhanna Kapsalyamova

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