

# Electricity Supply Interruptions in the Philippines: Characteristics, Trends, Causes

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*Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas*

# Background

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- Electricity is an indispensable input for modern economies
- There are interdependencies among critical infrastructure (Kjølle et al. 2012)
- Electricity supply interruptions affect businesses, workers, households

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Q: Are electricity supply interruptions an issue in our country?

## **Business Environment Obstacles for Firms in the Philippines**

<b>Factors</b>	<b>% of firms</b>
Informal sector	20.0
Corruption	11.5
Access to finance	10.4
Tax rates	9.0
Electricity	7.9
Labor regulations	6.4
Access to land	6.0
Transportation	5.2
Trade regulations	5.0
Business licensing	4.5

Source: World Bank Enterprise Survey 2015

### Select indicators on electricity, 2015

	% of firms experiencing electrical outages	% of firms identifying electricity as a major constraint	No. of electrical outages in a month	Average duration of electrical outage (hr)	Average losses due to electrical outages (% of annual sales)	% of firms owning/sharing a generator	% share of electricity from generator
<b>All countries</b>	50.6	30.8	5.3	4.1	4.0	32.1	17.4
East Asia and Pacific	46.3	17.1	4.8	3.6	2.9	33.1	15.5
<b>Philippines</b>	39.9	19.6	0.1	3.0	0.8	42.7	38.9
<i>Manufacturing</i>	44.1	26.4	0.1	4.6	0.9	39.7	41.2
<i>Services</i>	38.5	17.4	0.1	2.4	0.8	43.7	38.2
<i>Calabarzon</i>	27.2	14.2	0.0	4.3	1.2	36.0	55.6
<i>Central Luzon</i>	60.2	28.6	0.1	3.4	0.4	48.6	16.2
<i>Metro Cebu</i>	48.1	3.2	0.3	1.8	1.4	66.4	43.0
<i>Metro Manila</i>	56.1	30.0	0.0	3.2	0.2	34.8	30.0
<i>NCR Excluding Manila</i>	29.7	18.8	0.0	12.9	1.1	39.4	45.8

Source: World Bank Enterprise Survey

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# Experience of households outside of NCR (serviced by Electric Cooperatives)

## Source of household electricity by island group, 2011

	With electricity	Source if with electricity		
		Private Utilities	Electric Coops	Others
NCR	98.4	82.6	0.0	17.4
Luzon, excl NCR	90.4	32.3	56.2	11.5
Visayas	84.7	18.4	65.4	16.2
Mindano	76.7	15.5	63.7	20.8
<b>All regions</b>	<b>87.2</b>	<b>33.6</b>	<b>51.3</b>	<b>15.1</b>

Source: Household Energy Consumption Survey

	Sample ECs	All ECs
Total (Count)	37	121
Broad region (%)		
Luzon	54	46
Visayas	22	26
Mindanao	24	28
Size (%)		
Small to Large	16	26
Extra Large	22	28
Mega Large	62	46



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Three indices:

- System Average Interruption Frequency Index (SAIFI)
- System Average Interruption Duration Index (SAIDI)
- Customer Average Interruption Duration Index (CAIDI)

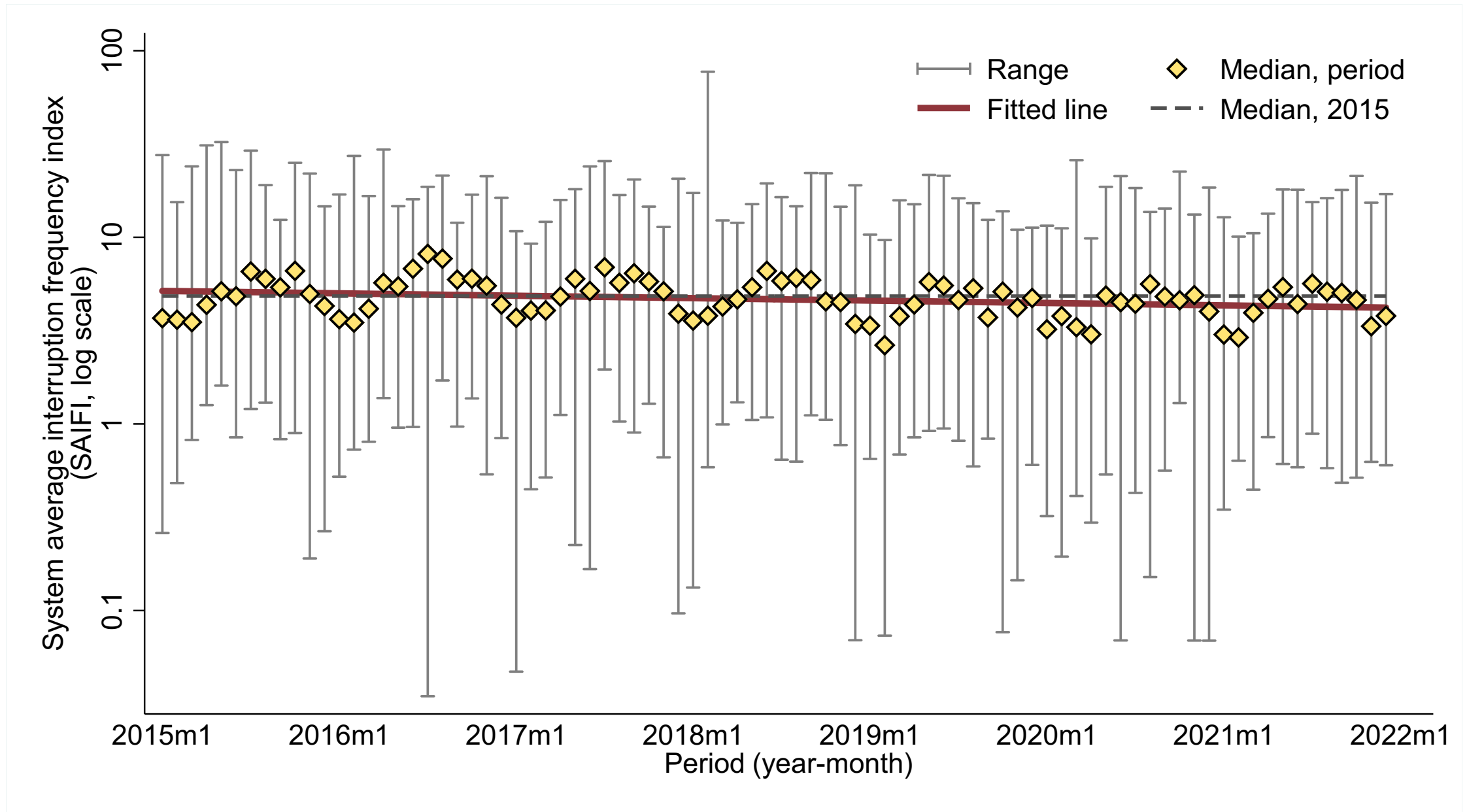
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# Frequency of power supply interruptions

## System average interruption frequency index, 2015-2021

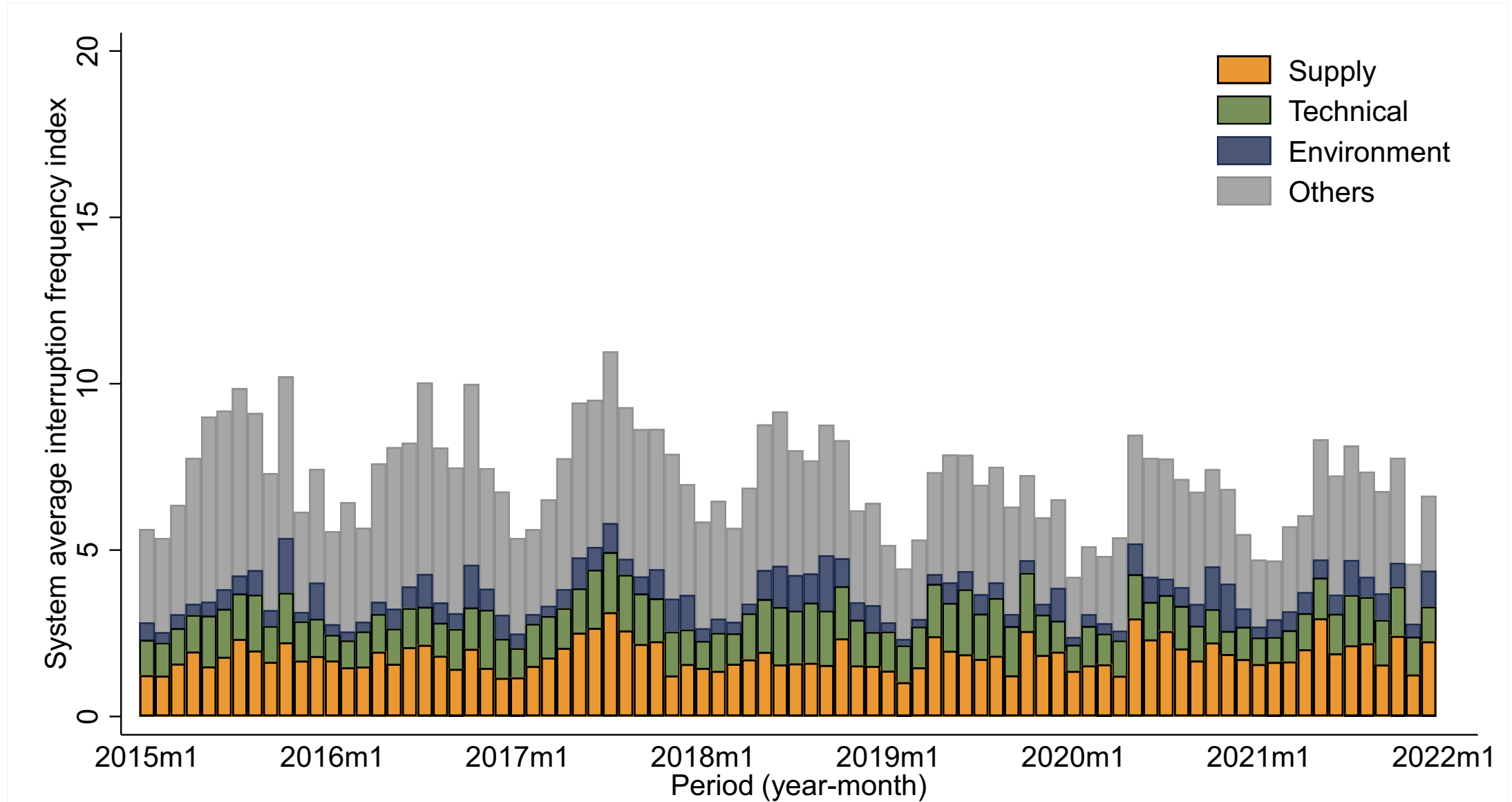
	2015	2016	2017	2018	2019	2020	2021
All sample	7.1	7.0	7.4	6.6	5.8	5.7	5.7
By island group							
Luzon	7.1	7.4	7.7	7.9	6.7	6.6	6.6
Visayas	6.8	6.7	8.7	5.3	5.2	5.5	5.4
Mindanao	7.2	6.3	5.6	4.8	4.5	3.9	4.1
By distributor size							
Small, Medium, Large	7.5	7.2	5.4	5.1	5.1	6.0	4.8
Extra large	6.2	6.4	7.4	7.8	6.6	6.9	7.6
Mega large	7.3	7.1	7.5	6.4	5.7	5.4	5.3
By interruption cause							
Human	0.1	0.1	0.0	0.0	0.1	0.0	0.0
Lightning	0.0	0.1	0.1	0.1	0.0	0.0	0.0
Major storm disaster	0.2	0.2	0.2	0.3	0.1	0.2	0.2
Scheduled	0.4	0.5	0.5	0.6	0.6	0.4	0.4
Trees	0.3	0.3	0.3	0.3	0.2	0.3	0.3
Overload	0.3	0.0	0.1	0.0	0.0	0.0	0.0
Error	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply	1.4	1.3	1.7	1.3	1.4	1.5	1.6
Equipment	0.5	0.6	0.6	0.7	0.7	0.5	0.6
Earthquake	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Others, N.E.C.	0.9	1.4	1.0	0.9	0.7	0.6	0.7
Unknown/Not stated	3.0	2.7	2.9	2.6	2.1	2.1	2.0

# Monthly system average interruption frequency index, January 2015-December 2021

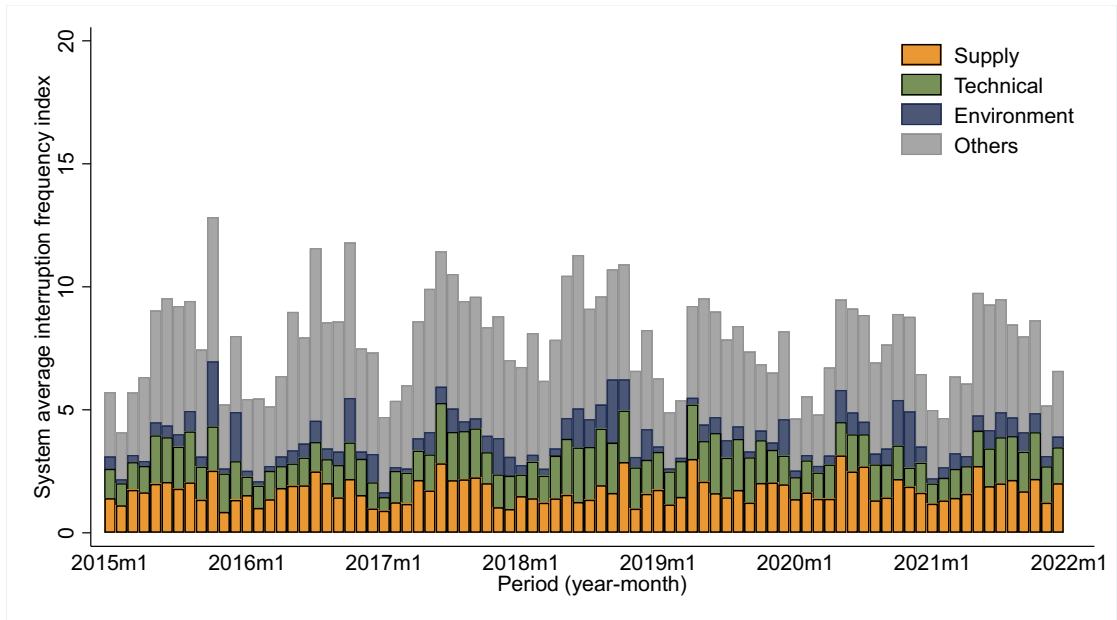


# Monthly system average interruption frequency index by region and cause, January 2015-December 2021

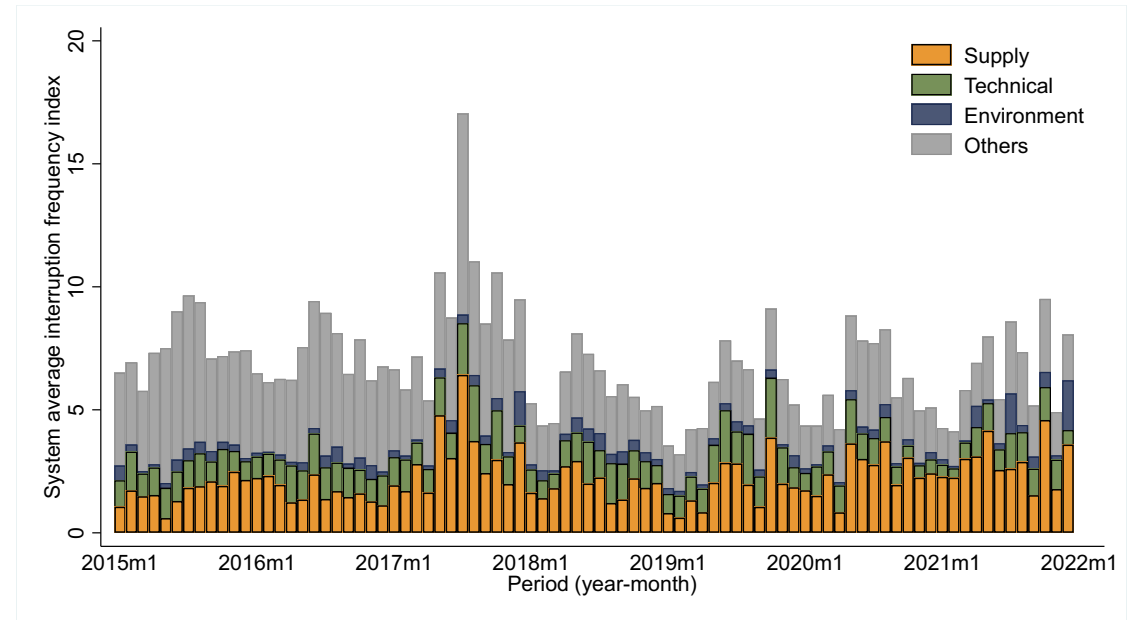
## A. All regions



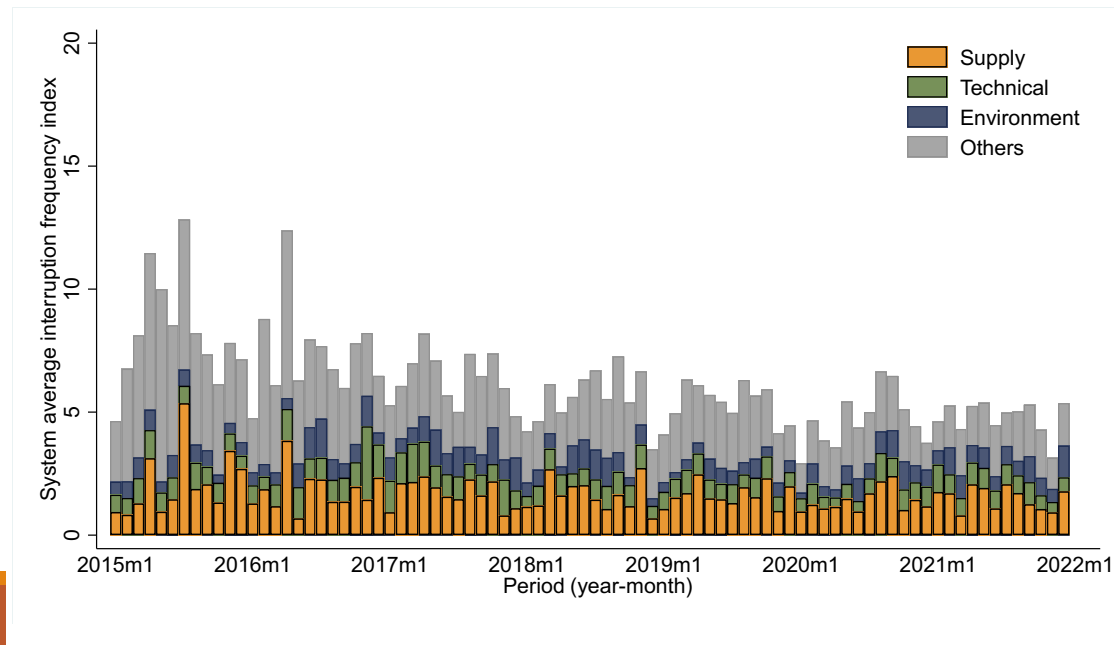
B. Luzon



C. Visayas



D. Mindanao



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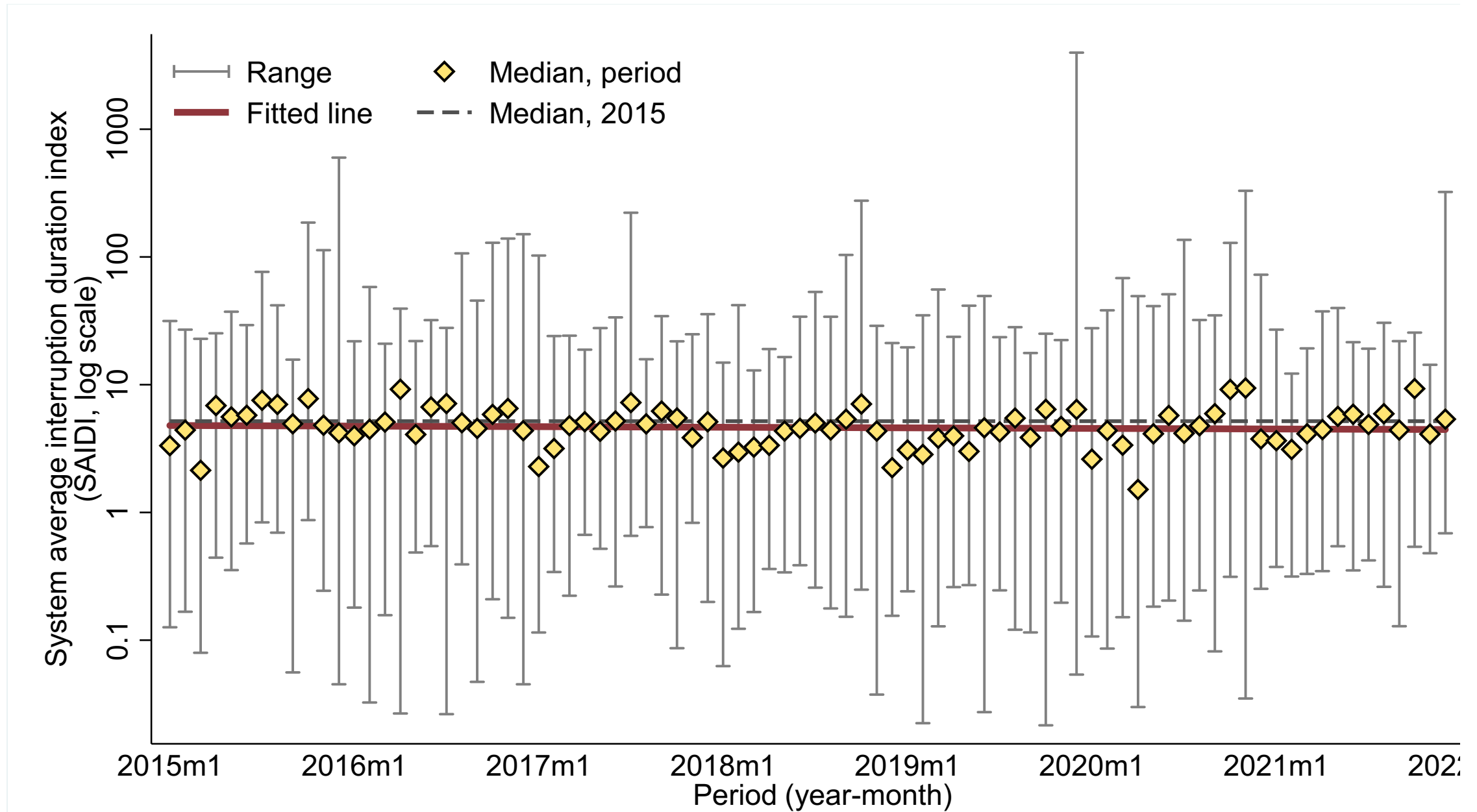
# Average duration

## System average interruption duration index, 2015-2021

	2015	2016	2017	2018	2019	2020	2021
All sample	11.3	9.8	9.6	8.0	16.3	10.3	8.8
By island group							
Luzon	14.0	11.2	9.4	9.9	26.0	14.8	8.6
Visayas	7.3	7.8	13.3	5.1	5.6	5.8	10.4
Mindanao	8.8	8.6	6.7	6.5	4.4	4.5	7.8
By distributor size							
Small, Medium, Large	14.0	14.0	11.0	14.3	12.6	15.5	9.4
Extra large	16.1	11.1	8.1	7.5	49.8	17.2	9.8
Mega large	9.9	9.2	9.8	7.7	7.9	8.2	8.5
By interruption cause							
Human	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Lightning	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Major storm disaster	2.4	1.0	0.4	0.8	8.6	1.9	1.9
Scheduled	1.5	2.0	1.7	1.6	1.7	1.6	1.5
Trees	0.2	0.2	0.3	0.3	0.2	0.2	0.2
Overload	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Error	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply	3.6	3.2	4.1	2.7	3.2	4.1	3.4
Equipment	0.3	0.4	0.3	0.3	0.3	0.3	0.3
Earthquake	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Others, N.E.C.	0.4	0.7	0.2	0.2	0.2	0.2	0.2
Unknown/Not stated	2.8	2.1	2.4	2.0	2.1	2.1	1.3

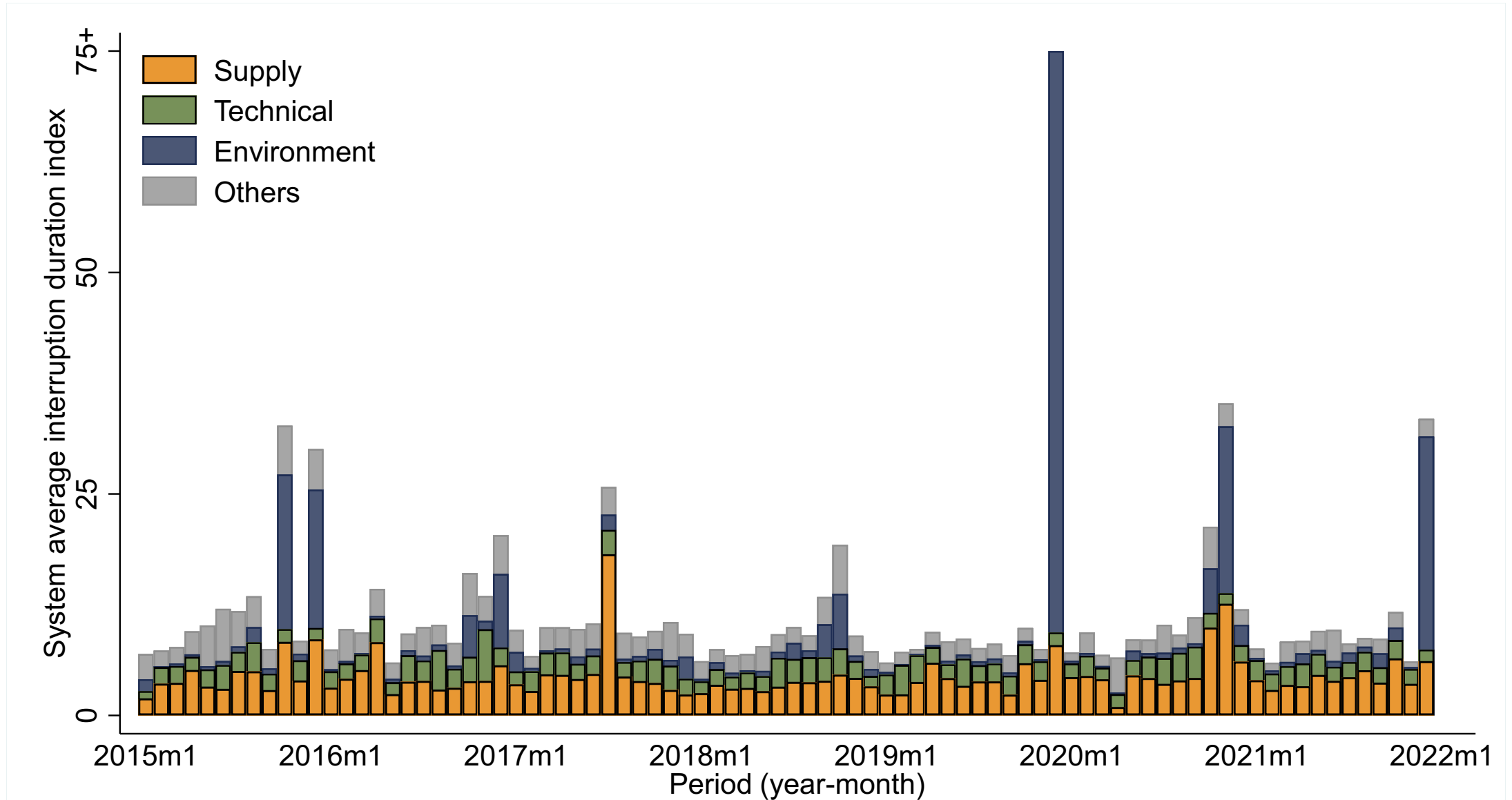


Monthly system average interruption duration index, January 2015-December 2021

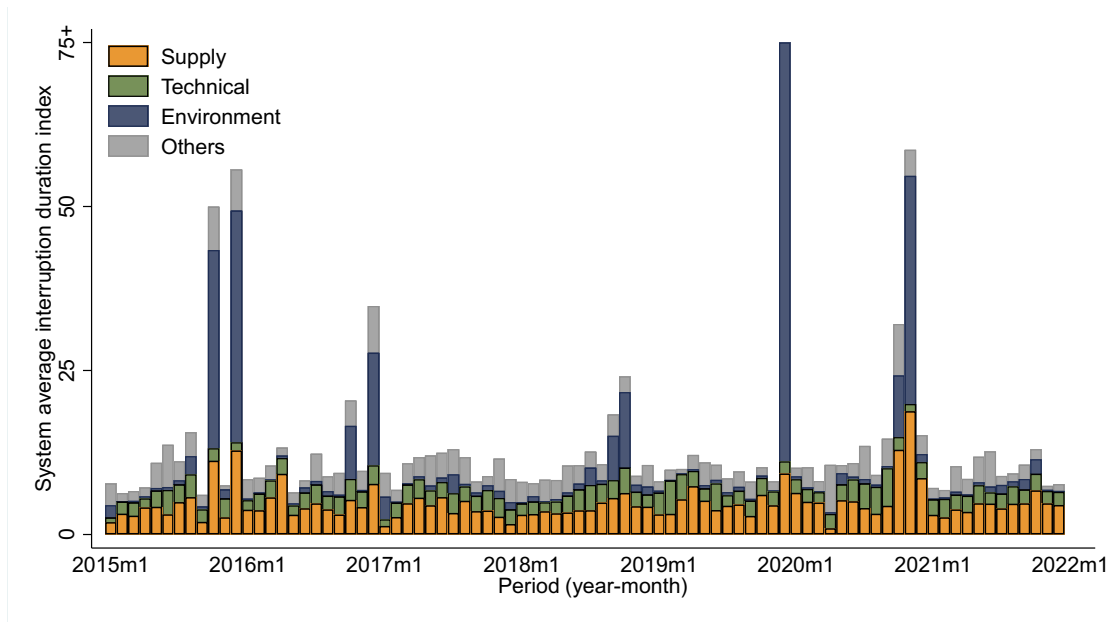


# Monthly system average interruption duration index by region and cause, January 2015-December 2021

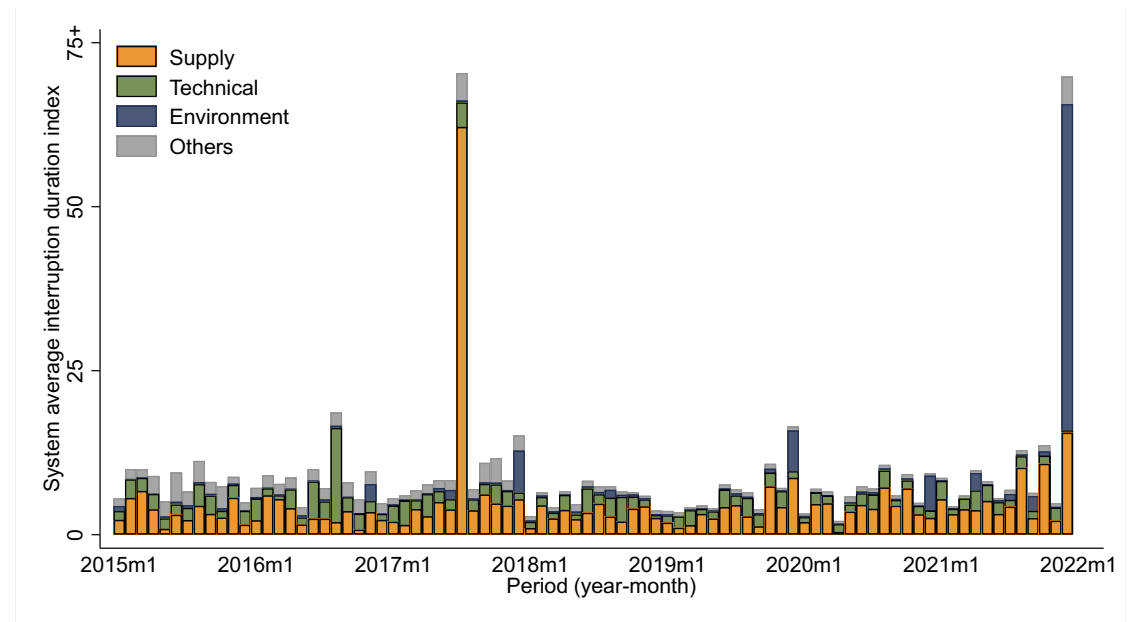
## A. All regions



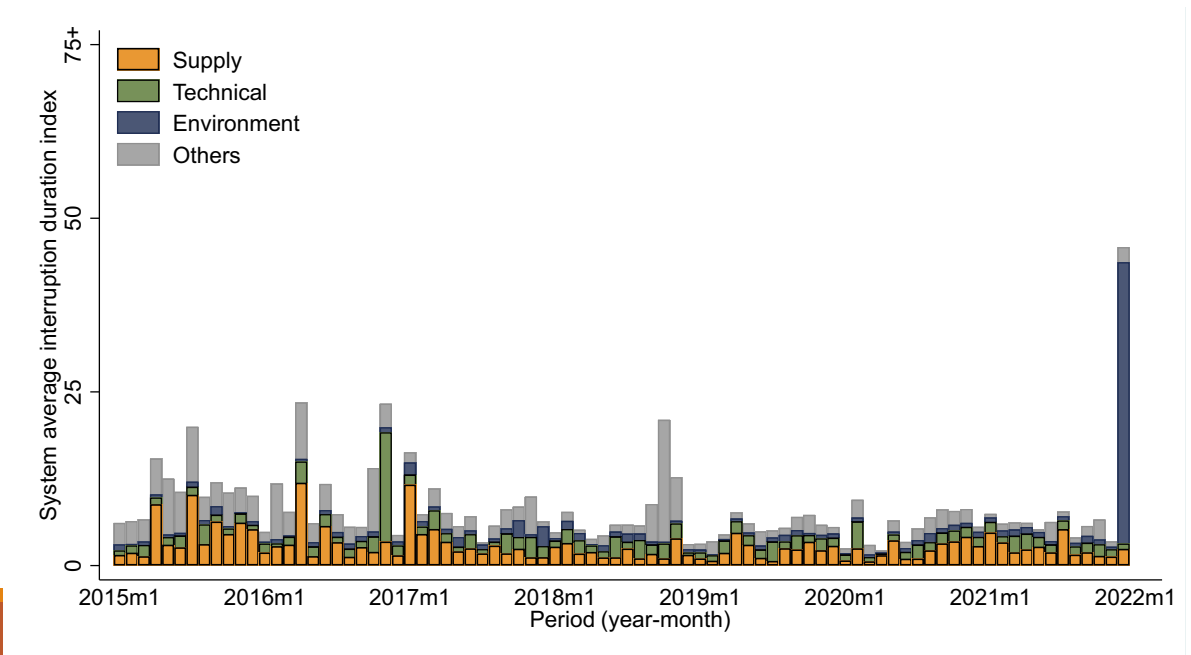
B. Luzon



C. Visayas



D. Mindanao



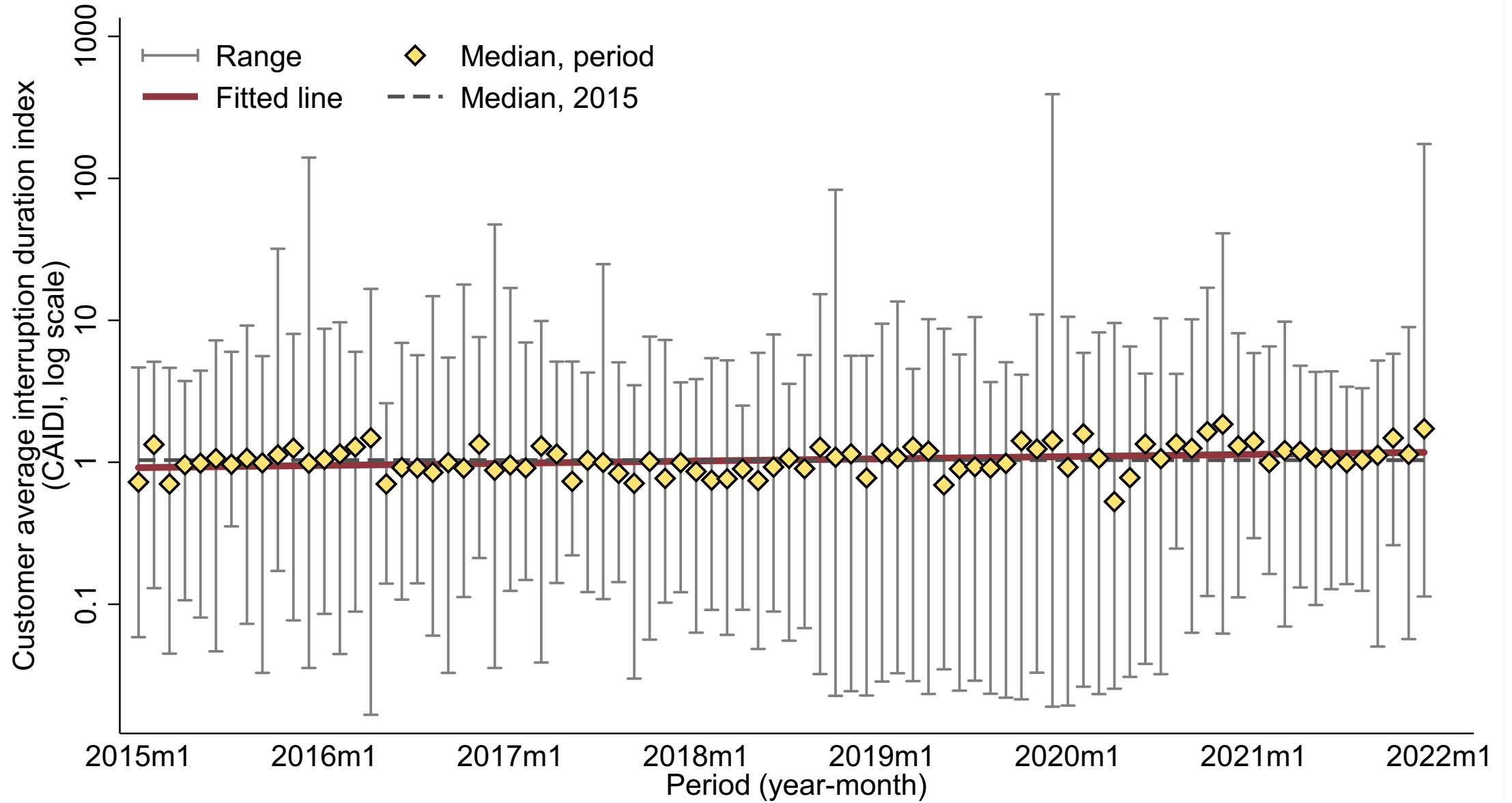
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# Power restoration

## Customer average interruption duration index, 2015-2021

	2015	2016	2017	2018	2019	2020	2021
All sample	1.6	1.4	1.3	1.2	2.8	1.8	1.5
By island group							
Luzon	2.0	1.5	1.2	1.2	3.9	2.3	1.3
Visayas	1.1	1.2	1.5	1.0	1.1	1.1	1.9
Mindanao	1.2	1.4	1.2	1.4	1.0	1.2	1.9
By distributor size							
Small, Medium, Large	1.9	1.9	2.0	2.8	2.5	2.6	2.0
Extra large	2.6	1.7	1.1	1.0	7.5	2.5	1.3
Mega large	1.4	1.3	1.3	1.2	1.4	1.5	1.6
By interruption cause							
Human	0.7	0.6	1.0	1.2	0.4	0.6	0.7
Lightning	1.1	1.0	1.4	0.7	1.3	1.1	1.2
Major storm disaster	12.2	6.0	2.4	3.1	81.9	8.5	9.0
Scheduled	3.5	4.5	3.1	2.9	3.2	3.9	3.7
Trees	0.9	0.8	1.0	0.9	0.8	0.7	0.7
Overload	0.2	1.5	0.2	0.5	0.2	0.2	0.3
Error	0.9	1.4	0.5	0.7	0.4	0.3	0.6
Supply	2.6	2.5	2.4	2.1	2.3	2.7	2.2
Equipment	0.6	0.7	0.5	0.5	0.4	0.6	0.4
Earthquake	0.3	0.1	1.4	1.6	0.3	0.1	0.7
Others, N.E.C.	0.5	0.5	0.2	0.3	0.2	0.3	0.3
Unknown/Not stated	0.9	0.8	0.8	0.8	1.0	1.0	0.7

Monthly customer average interruption duration index, January 2015-December 2021



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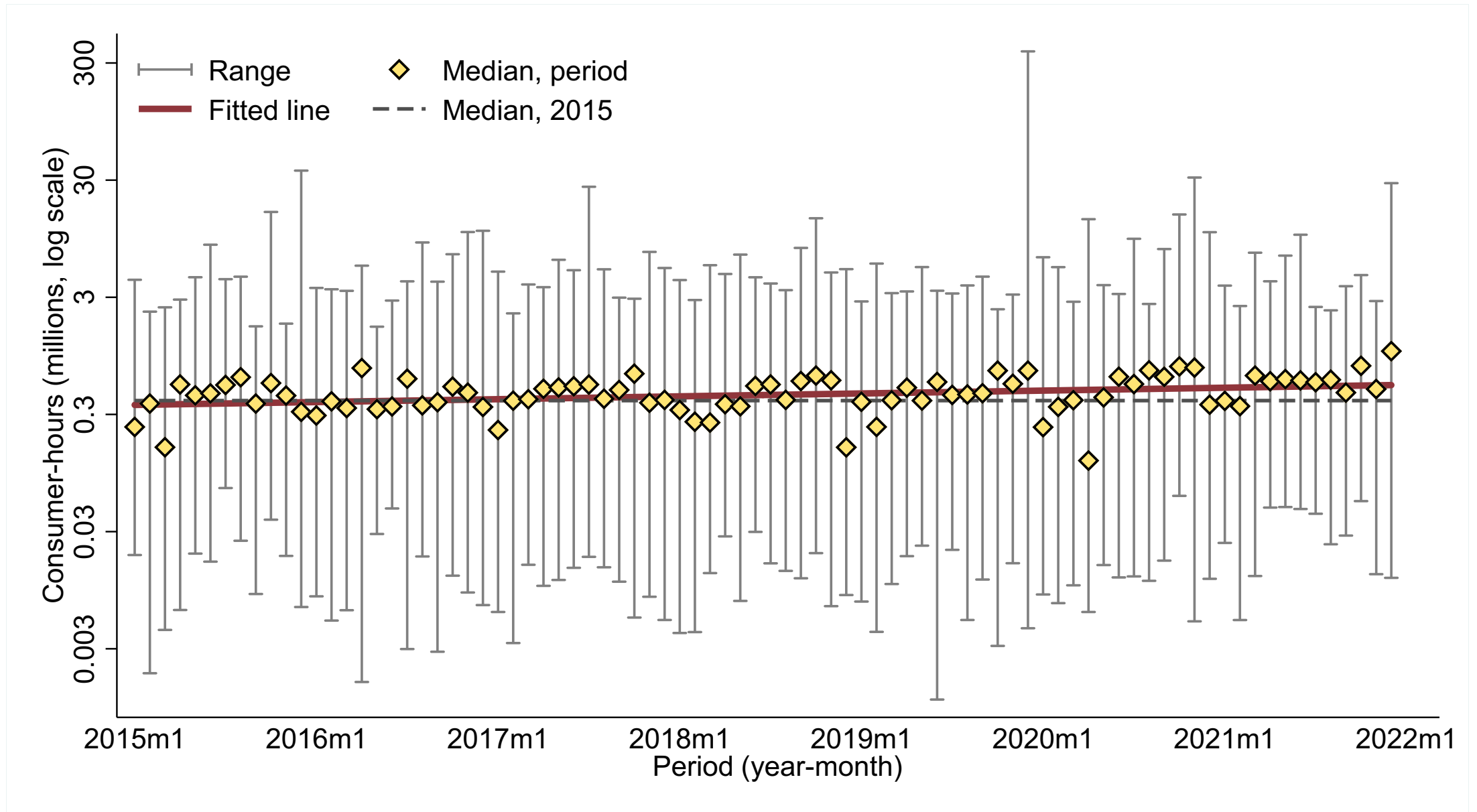
# Size of effect

## Total electricity connection interruption (in million consumer-hours), 2015-2021

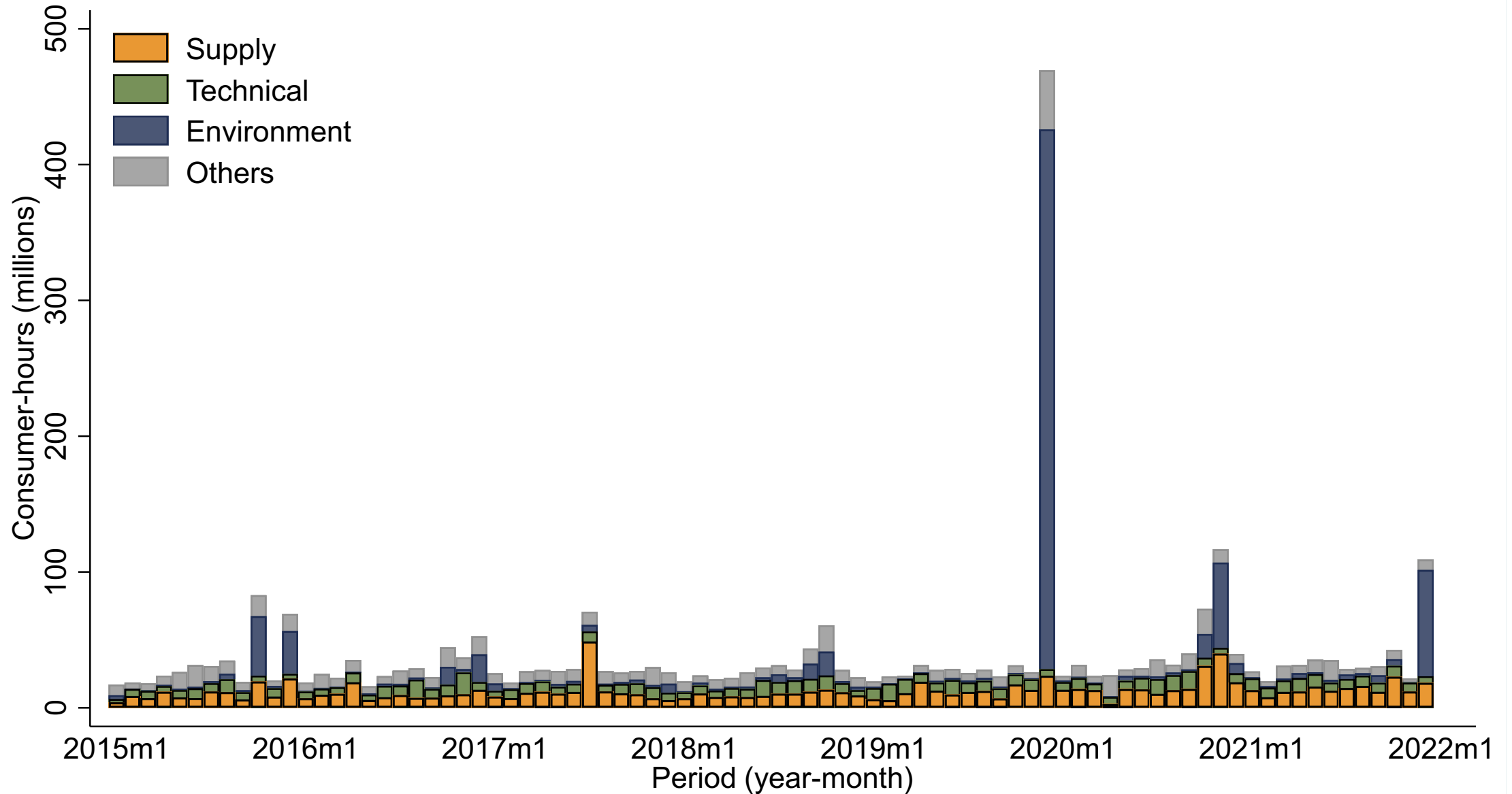
	2015	2016	2017	2018	2019	2020	2021
All sample	391.6	353.0	361.0	355.9	757.7	496.3	441.0
By island group							
Luzon	264.7	216.4	190.9	237.6	650.3	381.5	227.9
Visayas	54.2	61.7	109.0	53.4	61.2	64.0	122.0
Mindanao	72.7	74.9	61.1	64.9	46.2	50.8	91.1
By distributor size							
Small, Medium, Large	26.5	27.8	21.9	31.9	29.3	38.0	24.4
Extra large	108.2	78.0	59.5	64.9	451.1	159.3	93.8
Mega large	257.0	247.2	279.7	259.1	277.3	299.0	322.8
By interruption cause							
Human	2.1	2.0	1.5	1.8	1.0	0.8	0.9
Lightning	1.6	2.0	2.8	1.4	1.3	1.4	1.5
Major storm disaster	81.2	34.9	16.0	35.6	399.2	89.8	94.7
Scheduled	50.6	73.0	63.4	71.7	80.2	74.6	73.6
Trees	7.7	7.5	10.7	11.3	8.6	9.7	8.4
Overload	2.4	1.8	0.6	0.4	0.2	0.1	0.2
Error	0.4	0.8	0.3	0.2	0.2	0.1	0.2
Supply	125.7	116.3	155.1	117.9	149.7	197.6	169.1
Equipment	10.1	13.5	12.0	14.2	13.9	14.6	14.2
Earthquake	14.4	24.0	9.0	10.5	7.2	8.9	11.2
Others, N.E.C.	95.4	77.1	89.1	90.4	96.3	98.8	66.9
Unknown/Not stated	0.0	0.0	0.4	0.5	0.0	0.0	0.1



Monthly electricity connection interruption (in consumer-hours), January 2015-December 2021



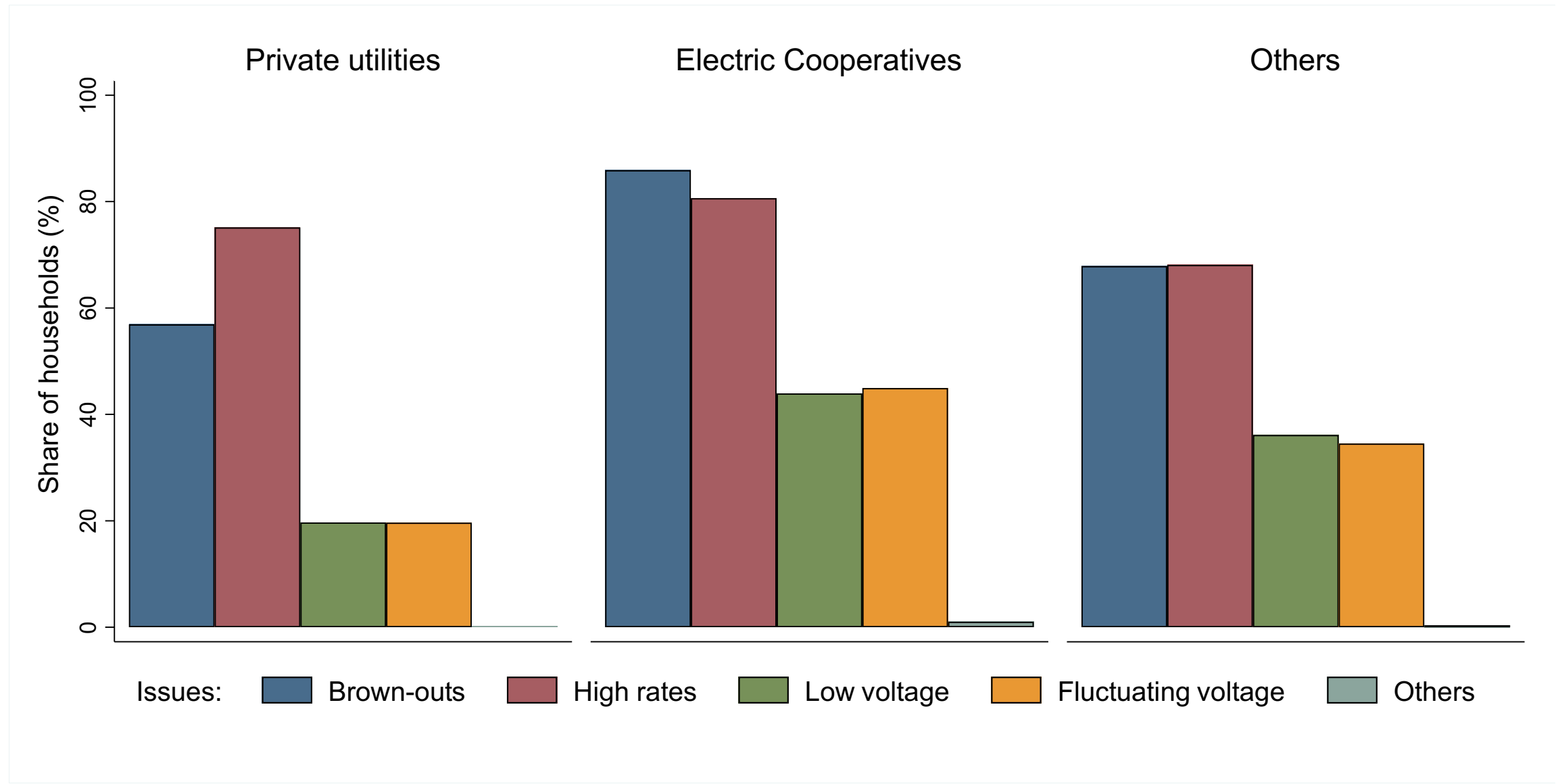
Monthly electricity connection interruption (in consumer-hours) by cause, January 2015-December 2021



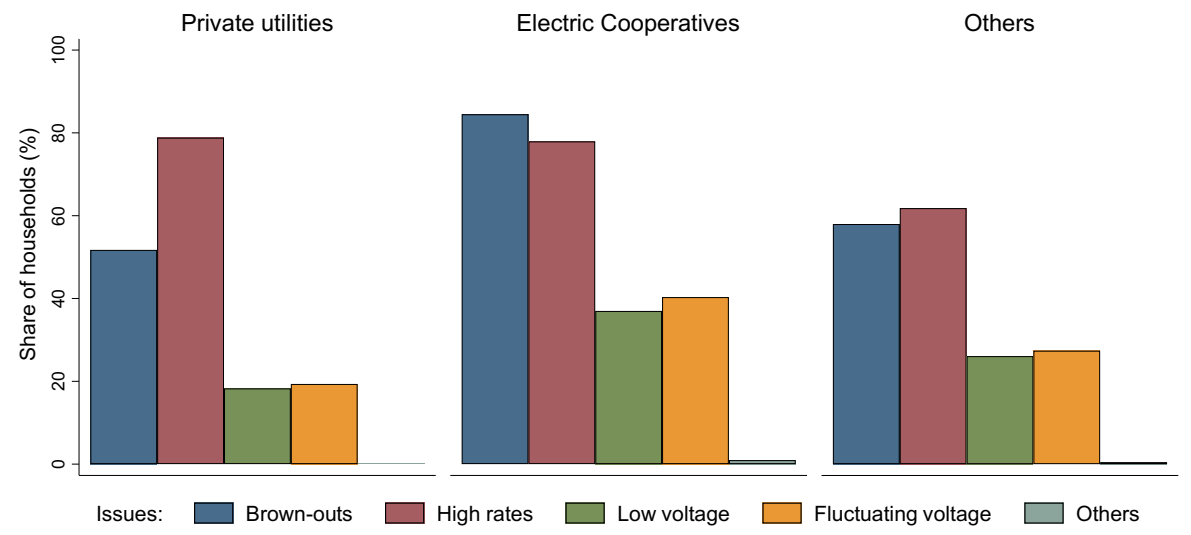
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Are these problems specific to electric cooperatives?

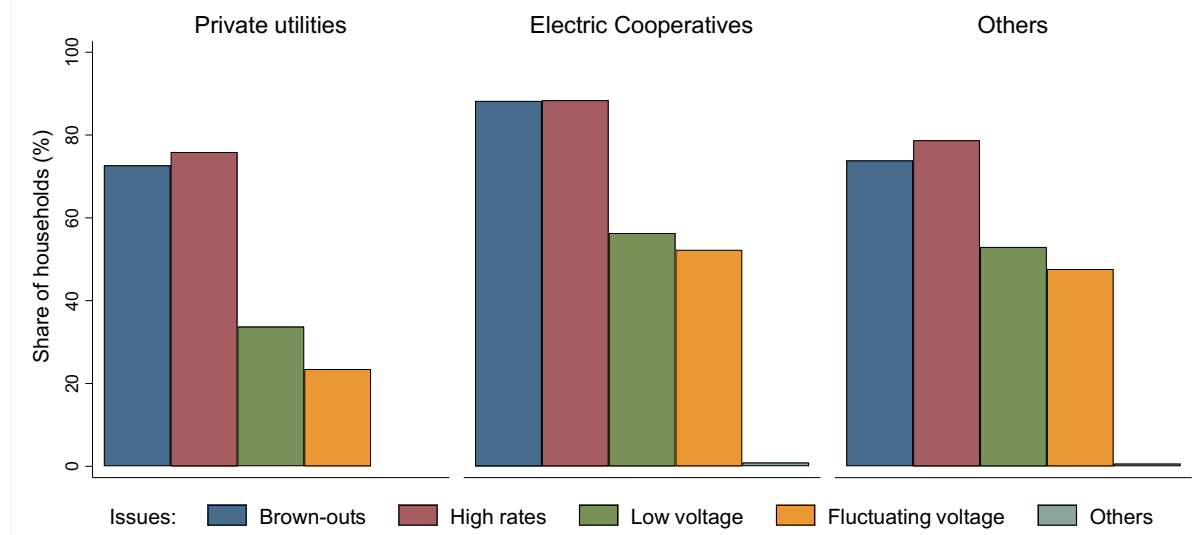
# Philippines



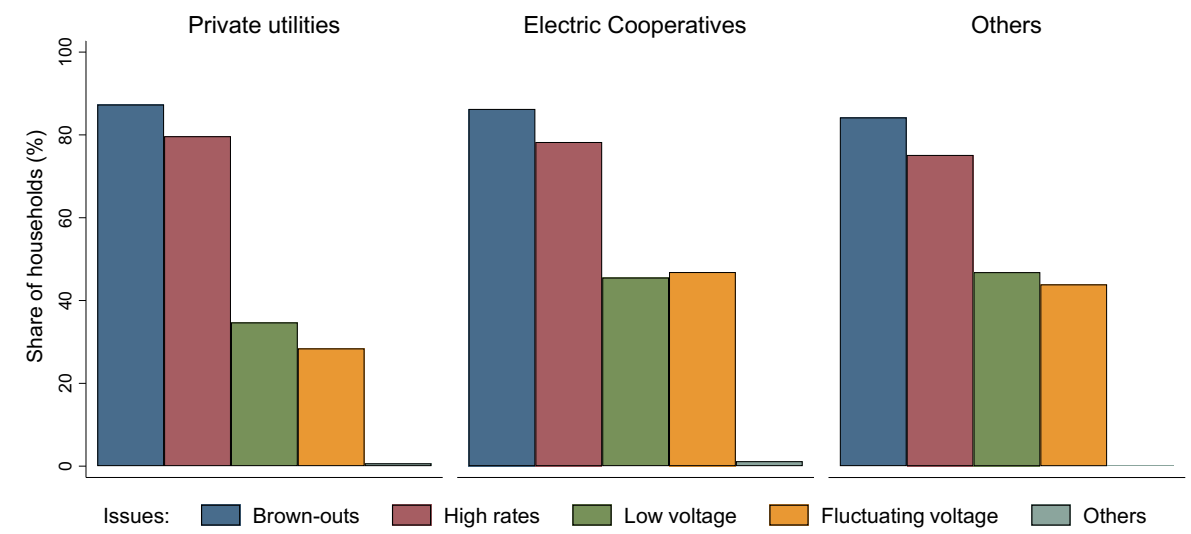
Luzon, excluding NCR



Visayas



Mindanao



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# SUMMARY AND KEY TAKEAWAYS

- 
- ❑ Power outages are still a problem in the country
  - ❑ 3 areas of intervention:
    - ✓ Power supply to ECs
    - ✓ Improving technical efficiency of ECs
    - ✓ Climate-proofing of infrastructure

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Thank you!