Motorcycle and car-based ride-hailing in the different income group: Adoption and frequency in Yogyakarta, Indonesia

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Abstract

In the Western setting, ride-hailing has been widely accepted as a car-based (C-RH) on-demand transport services. In South-East Asia, including Indonesia, motorcycle-based ride-hailing (MC-RH) is more popular than C-RH. The adoption of ride-hailing also more related with middle/high-income group, and little paid attention for lower-income group.

This study investigates the adoption and frequency of use for MC-RH and C-RH in the Indonesian context, including the interaction among both transport services. We analyzed primary data that was collected in the Yogyakarta Province, Indonesia.

Results indicate that the lower-income group is less likely to use ride-hailing services. In general, our results indicate that adopters are more often women, young people, tech-savvy, and living in urban area. Based on the frequency ride-hailing use, MC-RH and C-RH were found to have a complementary relationship.

Objectives

1) What factors influence of the adoption of ride-hailing services in the Indonesian context?
2) How do C-RH and MC-RH mutually influence each other, and do they complement of substitute for each other?;
3) What factors drive or limit the frequency of using C-RH and MC-RH?; and
4) How do people in low-income communities use ride-hailing services differently than people in middle-high income communities?

Data & Methods

Data collection:
1. Survey : May 2021 and January 2022.
2. Online survey → middle/high-income group
   Offline survey → low-income group.
3. Stratified sampling for five employment situations: student, full time employee, full time self-employed / entrepreneur / freelancer, part-timer and unemployed.
4. Conditions for inclusion in the survey included a minimum age of 18 and that no other household member had already participated.

Questionaire:
1. Ride-hailing membership
2. Frequency to use ride-hailing (MC-RH & C-RH)
3. Socio-demography (e.g., age, income, education, occupancy)
4. Spatial characteristics (e.i., living area)
5. Household (HH) characteristics (e.g., size, house type)
6. Vehicle ownership in the household (motorcycle, car, bike)
7. ICT literacy (internet duration)
8. Motivation to use ride-hailing (e.g., cheap, fast, comfortable, COVID-19 effects).
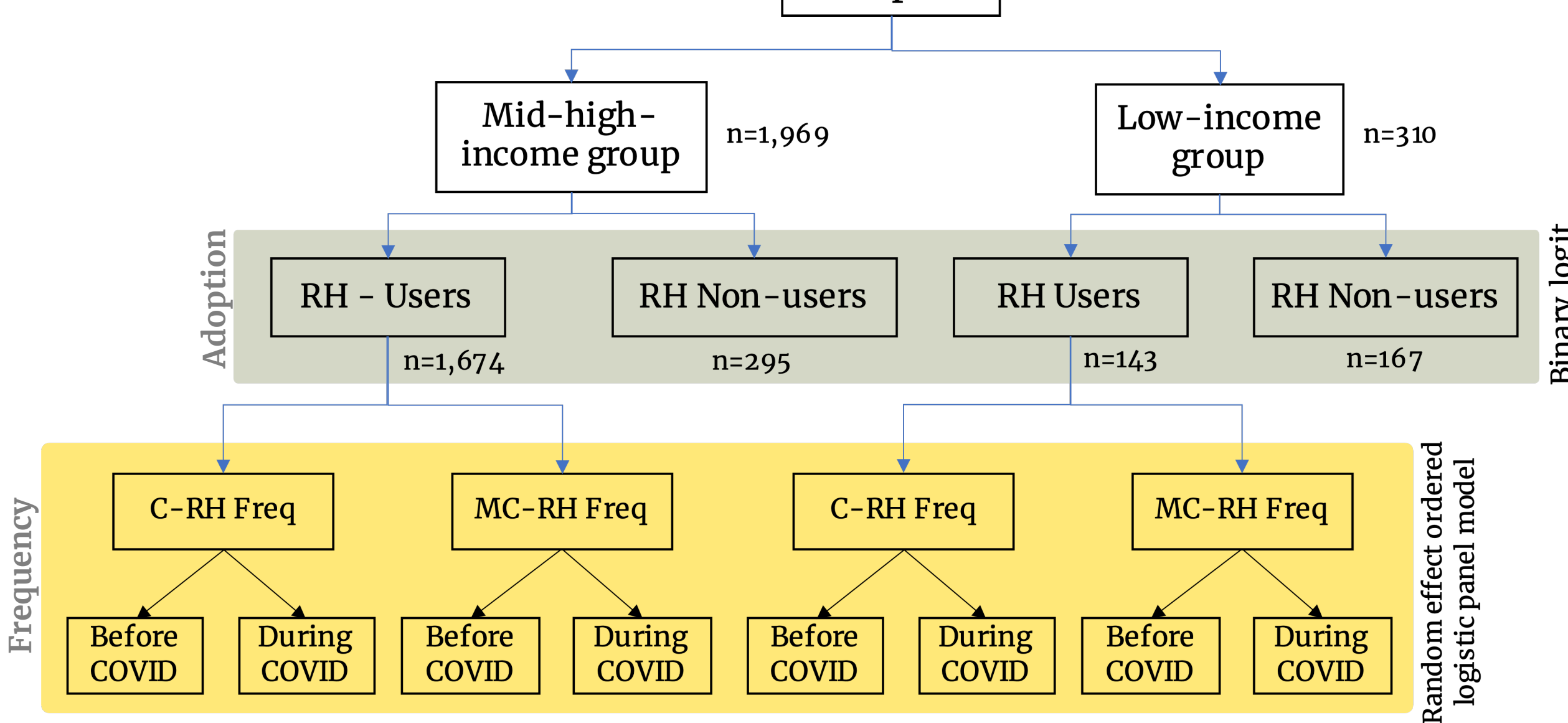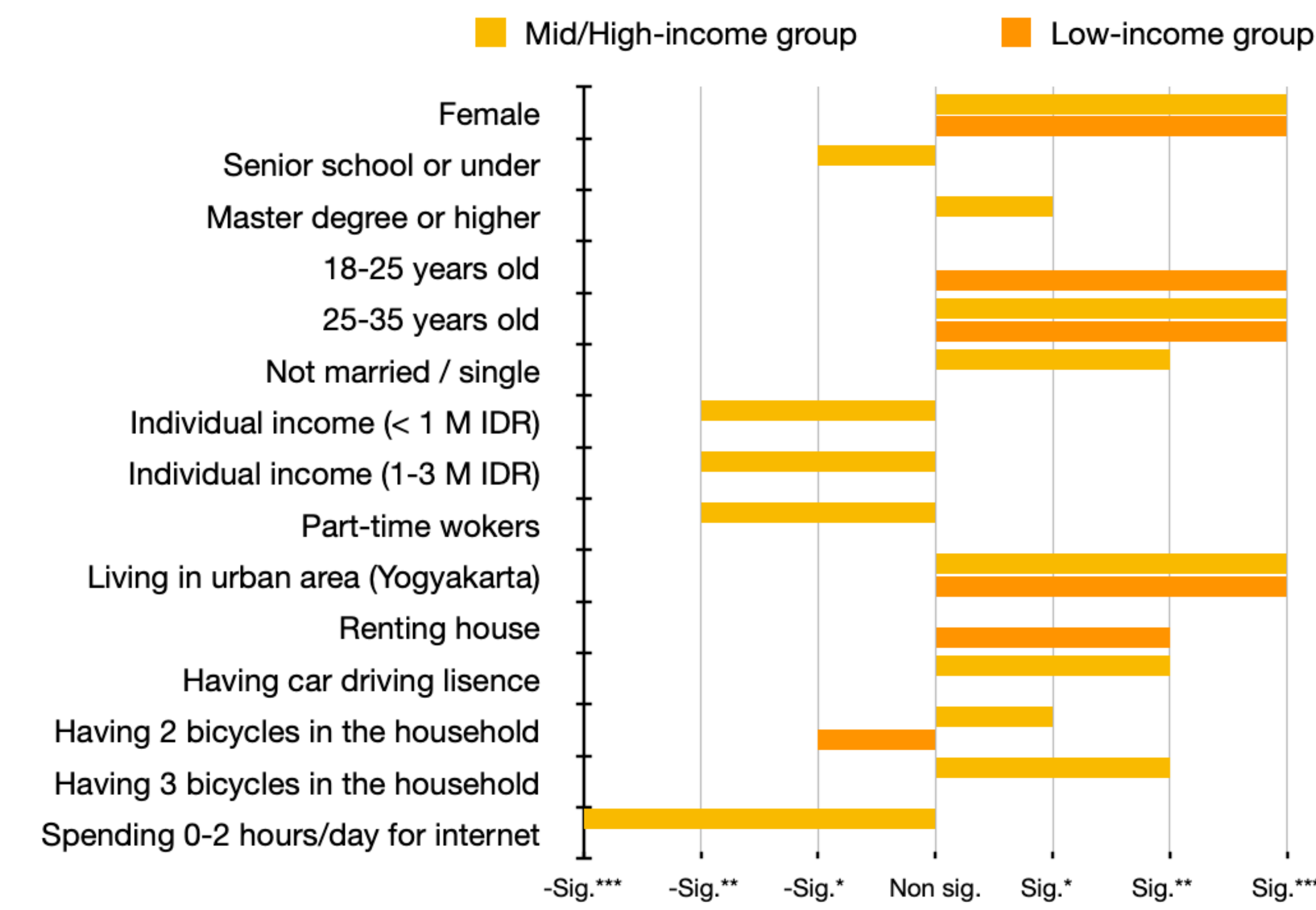
Descriptive Statistics:

Figure 1. Data Structure

Table 1. Membership Distribution in Ride-hailing Services

Variables	Mid/High-income group (n=1,969)				Low-income group (n=310)			
	RH User		RH Non-user		RH User		RH Non-user	
	Count	%	Count	%	Count	%	Count	%
Woman	1.028	61	174	59	87	61	72	43
Man	646	39	121	41	56	39	95	57
Senior school or under	13	1	10	3	11	8	11	7
Highschool	899	54	157	53	112	78	130	78
Bachelor or equivalent	696	42	122	41	20	14	26	16
Master's degree or higher	66	4	6	2	–	–	–	–
18 - 25 years old	1.062	63	154	52	90	63	72	43
25 - 35 years old	314	19	34	12	38	27	29	17
More than 35 years old	298	18	107	36	15	10	66	40
Not Married	1.203	72	163	55	106	74	93	56
Married	471	28	132	45	37	26	74	44
No monthly income	495	30	83	28	46	32	52	31
< 1 M IDR	394	24	97	33	42	29	34	20
1 – 3 M IDR	580	35	84	28	55	38	81	49
> 3 M IDR	204	12	31	11	–	–	–	–
Students	808	48	111	38	40	28	50	30
Full-time workers	593	35	114	39	53	37	82	49
Part-time workers	103	6	36	12	28	20	17	10
No Job	170	10	34	12	22	15	18	11
Living in Yogyakarta City	348	21	36	12	28	20	13	8
Living in Sleman Region	747	45	135	46	42	29	67	40
Living Bantul Region	579	35	124	42	73	51	87	52
House own by my family	1.342	80	264	89	126	88	166	99
Rented house	332	20	31	11	17	12	1	1
Landed house	1.475	88	275	93	136	95	167	100
Apartment /Others	199	12	20	7	7	5	–	–
< 2 family members	246	15	32	11	12	8	6	4
2 – 4 family members	776	46	140	47	85	59	119	71
4 – 6 family members	520	31	98	33	40	28	36	22
> 6 family members	132	8	25	8	6	4	6	4
Having car driving lisence	405	24	54	18	–	–	–	–
No have	1.269	76	241	82	143	100	167	100
Having MC driving lisence	1.337	80	229	78	105	73	134	80
No have	337	20	66	22	38	27	33	20
0 motorcycle in the HH	31	2	5	2	2	1	3	2
1 motorcycle in the HH	734	44	127	43	74	52	44	26
2 motorcycles in the HH	431	26	65	22	43	30	56	34
3 motorcycles in the HH	289	17	65	22	21	15	56	34
> 3 motorcycles in the HH	189	11	33	11	3	2	8	5
0 car in the HH	1.050	63	196	66	143	100	167	100
1 car in the HH	512	31	83	28	–	–	–	–
2 cars in the HH	74	4	9	3	–	–	–	–
3 cars in the HH	21	1	3	1	–	–	–	–
> 3 cars in the HH	17	1	4	1	–	–	–	–
0 bicycle in the HH	968	58	155	53	95	66	70	42
1 bicycle in the HH	359	21	81	27	34	24	38	23
2 bicycles in the HH	17	1	29	10	6	4	39	23
3 bicycles in the HH	110	7	13	4	6	4	18	11
> 3 bicycles in the HH	59	4	17	6	2	1	2	1
0 – 2 hours internet/day	105	6	52	18	18	13	14	8
2 – 4 hours internet/day	332	20	56	19	34	24	32	19
> 4 hours internet/day	1.237	74	187	63	91	64	121	72

Result

Ride-hailing Adoption

Mid/High-income group   Low-income group

Female	
Senior school or under	
Master degree or higher	
18-25 years old	
25-35 years old	
Not married / single	
Individual income (< 1 M IDR)	
Individual income (1-3 M IDR)	
Part-time wokers	
Living in urban area (Yogyakarta)	
Renting house	
Having car driving lisence	
Having 2 bicycles in the household	
Having 3 bicycles in the household	
Spending 0-2 hours/day for internet	

-Sig.***   -Sig.**   -Sig.*   Non sig.   Sig.*   Sig.**   Sig.***

Model fit of binary logit:

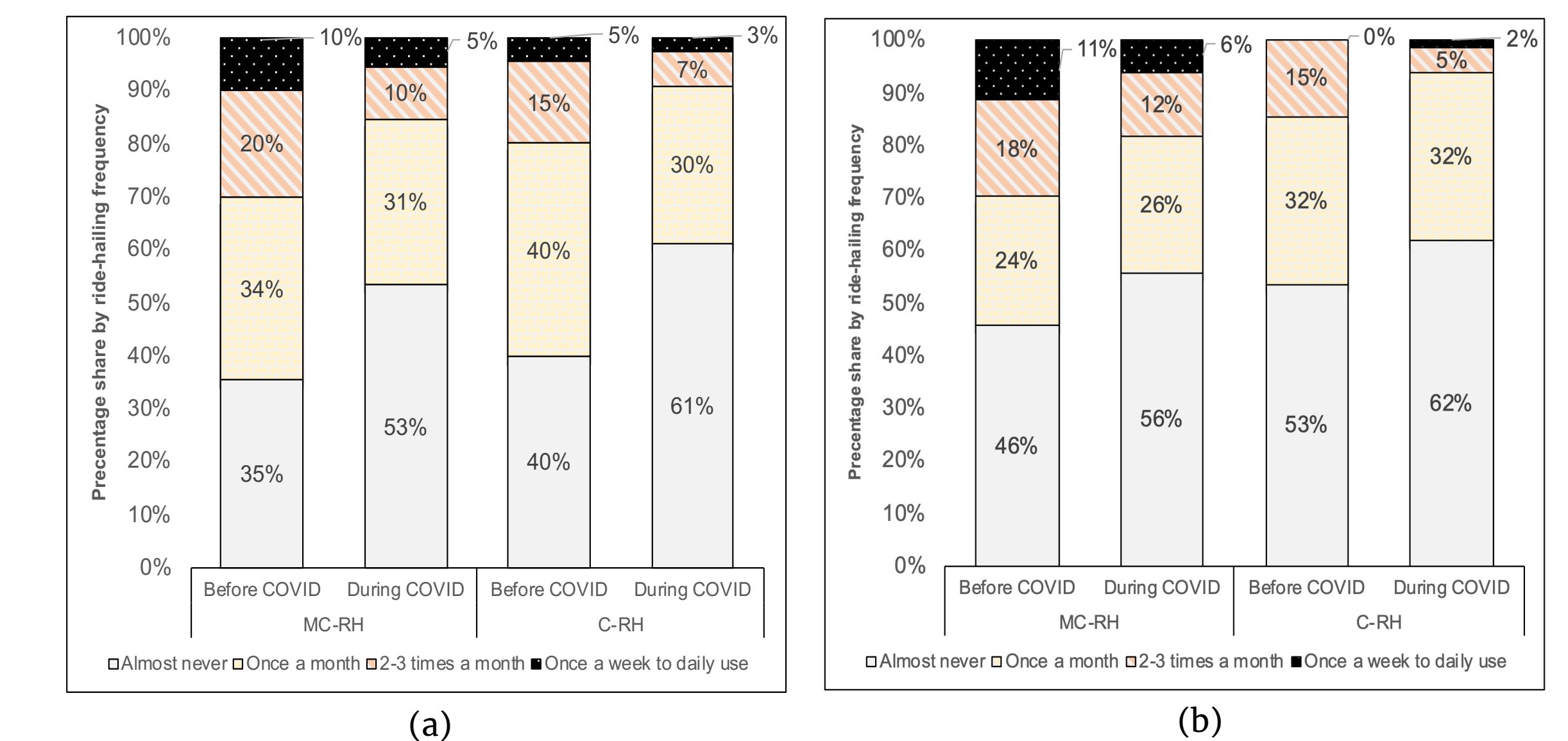|	Mid/high-income group	Low-income group
Observations	1.969	310
Log Likelihood	–748,34	–152,29
DF	39	29
AIC	1.574,680	362,578
Pseudo R2 McFadden	0,100	0,288

Figure 3. The Frequency of MC-RH and C-RH Before and During COVID: (a) Mid-High-Income; (b) Low-Income Group

Ride-hailing Frequency

MC-RH — **Middle-high-income group**
- Low to high frequency of C-RH ·
- Male ·
- Not married/single people ·
- Living in urban area (Yogyakarta) ·
- Living in apartment/boarding/others ·
- No have motorcycle driving license ·
- Own 0 – 3 motorcycles in the HH ·
- Own 2 bicycles in the HH ·
- Attitudinal variable: Accessibility of RH ·
- Strongly affected during COVID ·

C-RH — **Middle-high-income group**
- Low to high frequency of MC-RH ·
- Female ·
- Less likely for high school degree or under ·
- Married people ·
- Less likely for middle or lower income (<3 M IDR ·
- Living in urban area (Yogyakarta) ·
- Have car driving license ·
- Less likely for own 3motorcycles in the HH ·
- Own 2 bicycles in the household ·
- Attitudinal variable: Accessibility of RH ·
- Strongly affected during COVID ·

MC-RH — **Low-income group**
- Middle frequency of C-RH
- Less likely for no monthly income
- Living in rented house
- Living in landed house
- Less likely for who live in urban area (Yogyakarta)
- No have motorcycle driving license
- Own 1 – 3 motorcycles in the HH
- High frequency for internet duration
- Attitudinal variable: Accessibility of RH
- Strongly affected during COVID

C-RH — **Low-income group**
- Middle frequency of MC-RH
- Less likely for low or no monthly income
- Live in urban area (Yogyakarta) & sub-urban (Sleman)
- Little effect during COVID

Model fit of random effect ordered logistic panel model:

	Mid/high-income group		Low-income group	
Threshold:	MC-RH	C-RH	MC-RH	C-RH
0 | 1	3.435	-0.395	3.14	0.545
1 | 2	7.364	4.163	6.097	5.874
2 | 3	10.481	7.432	8.681	11.081
Random effect (Sigma)	9.591	8.912	6.225	9.13
Statistics:				
Observations	3004	3004	262	262
Log Likelihood	-2,768.308	-2,440.503	-231.2902	-169.2523
DF	47	47	38	39
AIC	5630,615	4975,006	538,5805	416,5047
BIC	5912,977	5257,368	674,1776	555,6701

Conclusion

- Lower-income group is less likely to adopt ride-hailing services, if they do, it will be at lower frequency.
- Both level income group seems have similar characteristics: female, young generation and living in urban area.
- MC-RH and C-RH appear to have a complementary relationship, when used at a low to moderate frequency.
- In the middle-upper-income group, MC-RH users are more about men, unmarried, and living in urban area, whereas C-RH users are more related for women, married, wealthier, and also living in urban area.
- In the low-income group, we identified only a few indicators that describe the characteristics of ride-hailing usage, since this group use ride-hailing less frequently compare with middle-high income group.
- Both income groups, the majority does not use ride-hailing as their main, daily mode of travel.
- Policy recommendation, we propose multimodal integration between ride-hailing and public transport, such the potential of implementation of MaaS.

Acknowledgements

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UMY — UNIVERSITAS MUHAMMADIYAH YOGYAKARTA