Consumers' Perception and Decision Making Regarding THRPs: Preliminary Evidence from a Discrete Choice Experiment in Indonesia

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Indonesian Development Foundation (IDF)

Disclaimer

- This research was funded with a grant from **Global Action to End Smoking** (formerly known as Foundation for Smoke-Free World - FSFW), an independent, U.S. nonprofit 501(c)(3) grantmaking organization, accelerating science-based efforts worldwide to end the smoking epidemic.

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CONTENTS

BACKGROUND

- An estimated 70 million Indonesians are active smokers in 2023 (MoH-RI, 2024).
  - E-cigarette users = 6.9 million (APVI, 2024)

- Despite the health risks, people still smoke, and find it difficult to quit.

- THRPs, such as e-cigarettes, have emerged as potential strategies to offer a viable alternative to traditional smoking cessation methods (Abdulrahman et al., 2020, Chan et al., 2019).
- The role of THRPs in public health remains highly contentious.

- Comprehensive research examining the consumer perception on THRPs (e-cigarettes and HTPs) use in Indonesia remains scarce.

OBJECTIVES

- **Main objective**: to gain a comprehensive understanding of the drivers behind consumer behavior and decision-making concerning CCs, ECs, and smoking cessation, and how these choices impact public health.

- **Specific objectives**:
  - Understand the choices smokers make when confronted with various smoking and nicotine options;
  - Explore how certain attributes of tobacco product such as price and flavor affects the decisions smokers make;

LITERATURE REVIEW

Preference-based perspectives

- **Actions determined by personal preferences (attitudes, values, goals) and expected utility.**
- **Theoretical Basis:**
  - **Prospect Theory:** People evaluate choices based on expected utility (Kahneman & Tversky, 1979).
  - **Expected Utility Theory:** Well-defined preferences predict future utility (von Neumann & Morgenstern, 2007).
- **Empirical Evidence:**
  - **Risk Attitudes:** Preferences influence risk-taking behavior (Weber et al., 2002).
  - **Brand Preferences:** Affect purchasing decisions (Bettman et al., 1998).

Choice-based perspectives

- **Focuses on decision-making processes influenced by context rather than predefined preferences.**
- **Behavioral Economics: Decisions influenced by framing, default options, and context (Thaler, 2008; Tversky & Kahneman, 1981).**
- **Empirical Evidence:**
  - **Framing Effect:** Choices affected by how options are presented (Tversky & Kahneman, 1981).
  - **Default Effect:** Individuals often choose default options (Johnson & Goldstein, 2003).

LITERATURE REVIEW (cont'd)

Factors that influence perceptions on smoking and THRP

- Health risks: The way people perceive these dangers is known as risk perception (Hammond et al., 2006; Creamer et al., 2021).
- Brand trust and reputation: One way through which this factor might be important is via cigarette packaging and diversification product (Smith & Hilton, 2022; van der Eijk et al., 2022; Smith et al., 2023a; Smith et al., 2023b; Zheng & Lin, 2023).

Decision-making Factors

- Importance of different attributes in consumer decision-making of selecting C-cig and E-cig: Price, nicotine, flavour, health warning label (Nguyen et al., 2022 ; Kenkel et al., 2023; Goto and colleagues (2007) (Buckell & Sindelar, 2019; Soule et al., 2022; Czoli et al., 2016; Barrientos-Gutierrez et al., 2021).
- Trade-offs consumers are willing to make: whether consumers are willing pay more or to compromise in the event of policy interventions (Shang et al., 2020; Lesmes and colleagues (2024).
- Segmentation of consumer groups based on preferences: Different age groups and generations exhibit varying preferences for tobacco products (Hoffman et al., 2016; Di Novi & Marenzi, 2019; Rubenstein et al., 2023; Smith et al., 2023).

Hypotheses

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Hypothesis 1

Higher prices of c-cig and e-cig will lead to a reduction in their consumption and an increase in the likelihood of quitting smoking or switching between products.

Hypothesis 2

The availability of flavored e-cigarettes (such as fruit, sweet, or candy flavors) will increase the likelihood of choosing e-cig over c-cig, among younger consumers.

Hypothesis3

Lower nicotine levels in e-cigarettes will reduce nicotine dependence and promote quitting behavior.

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METHODOLOGY

METHODOLOGY

Data collection:

- **Online survey by IDF team in collaboration with SSRS**
- **Focused Group Discussions (FGDs)**

Survey design: The Discrete Choice Experiment (DCE)

- Stated-preference methods include a variety of evaluation techniques aimed at understanding individual preferences.
- DCE can help understanding the decisions adult smokers make when confronted with various attributes of tobacco choices (cigarette, e-cigarette, quit).

METHODOLOGY – DCE details

- DCE Survey:
  - Respondents: adults aged 18+ in Indonesia who smoked cigarettes in the past 30 days (classified as a smoker)
- Experimental design:
  - 3 (cigarette price) x 3 (e-cigarette price) x 3 (nicotine levels of e-cigarettes) x 3 (flavor availability of e-cigarettes) design, for a total of 81 possible attribute combination
  - Each respondents were presented with 12 tasks, each comprises three choices (Combustible cigs., electric cigs, or quit).
- Sampling benchmark: 2022 Indonesian Socioeconomic Survey (Susenas)
  - Total sample: 627 smokers, design effect: 1.60, margin of error: 4.9 percentage points.

METHODOLOGY – Questionnare Structure

1

Part I – Product Consumption

- Cigarette Consumption Section
- E-cigarette Consumption Section

2

Part II – DCE Experiment

3

Part III – Post Questions

4

Part IV – Demographics

Methodology – DCE Attributes & Levels

Attributes	Options		
	Combustible cig.	**Electric cig.**	**Quit**
Flavor	1 flavor (your current flavor)	3 flavors: fruit/sweet/candy, menthol, tobacco	-
Excise tax	1 excise tax description	1 excise tax description	-
Warning message	5 different warning message graphics based on the MoH regulation were randomized throughout the tasks to replicate the current local market conditions as much as possible.	1 textual warning message – Warning: This product contains nicotine. Nicotine is an addictive chemical.	-
Nicotine level	1 nicotine level - *Each stick you consume contains between 22.8 – 31.2 mg if you smoke regular cigarette, or 21.6 mg if you smoke mild/ light cigarette.*	3 nicotine levels - Each ml of e-cigarette you consume contains: (a) 17 - 36 mg/ml for heavy; (b) 9 - 16 mg/ml for medium; (c) Up to 8 mg/ml for light	-
Price	3 price levels: 0.5*P, 1*P, and 2*P (based on reported price)	3 price levels: (100,000 Rp/200,000 Rp/400,000 Rp)	-

Methodology – Data Analysis

- Descriptive statistics
- Regression analyses:
  - Linear Probability Models (LPM)
  - Logistic Regression Models (LOGIT)
  - McFadden Conditional Logit Regression Models (CMCLOGIT)
- All of the data processing and analysis were conducted using Stata MP version 18.0.

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RESULTS

RESULTS – Descriptive Statistics

	Summary
N	627
Smoke everyday	0.793
Number of days spent vape last month	11.828 (6.976)
Considering quitting smoking in 6 months	
No	263 (41.9%)
Yes	364 (58.1%)

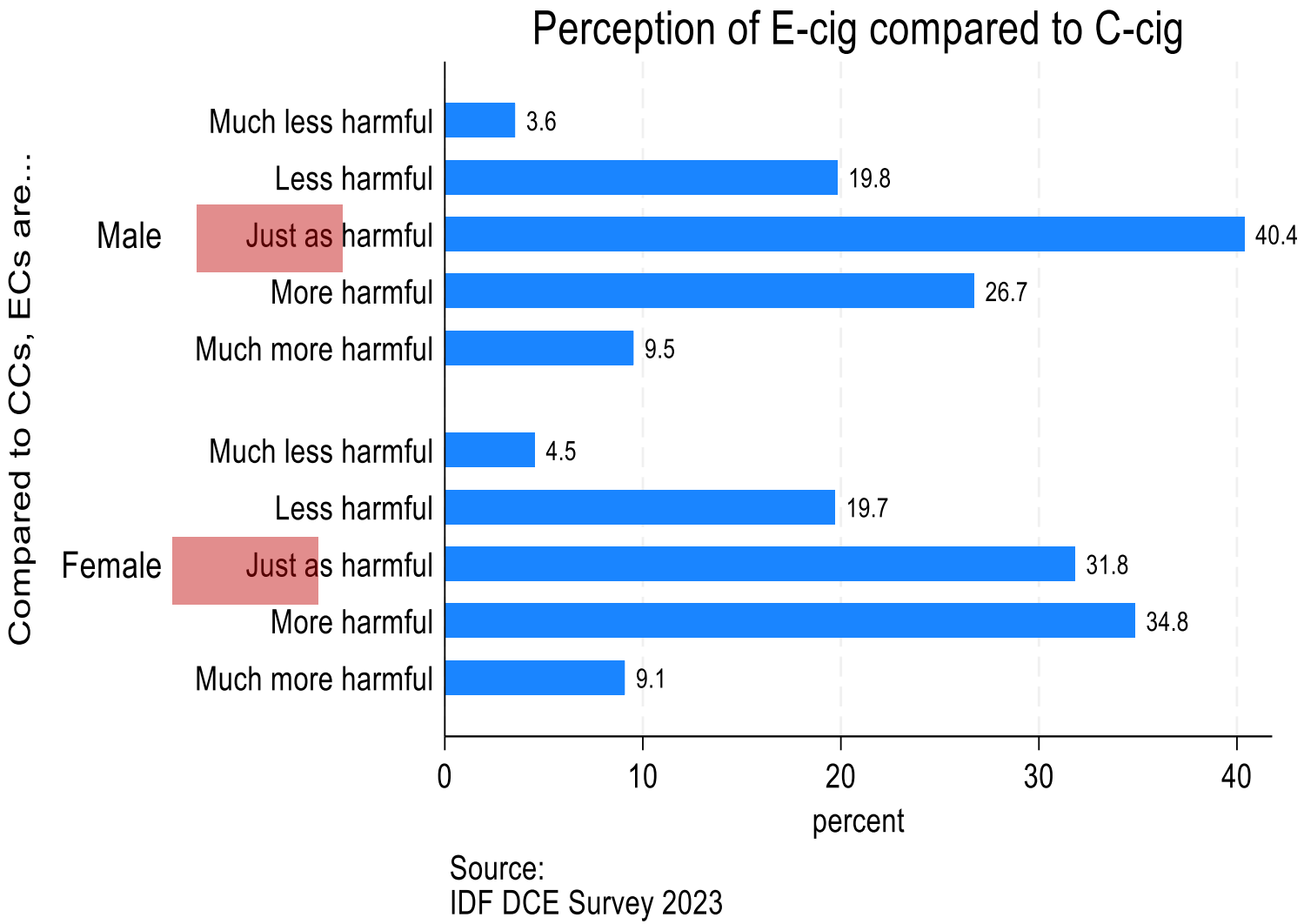
	Summary
N	7,524
Immediate choice today	
C-cig	4,514 (60.0%)
E-cig	2,531 (33.6%)
Quit	479 (6.4%)
Choice of 6 months from now	
C-cig	4,177 (55.5%)
E-cig	2,756 (36.6%)
Quit	591 (7.9%)

RESULTS – Descriptive Statistics (cont'd)

	Summary
N	627
Sex	
Male	561 (89.5%)
Female	66 (10.5%)
Age (in years)	35.276 (10.172)
Age group	
18-24	74 (11.8%)
25-39	373 (59.5%)
40-64	161 (25.7%)
65+	19 (3.0%)
Highest education	
Senior high school or lower	207 (33.0%)
Diploma 1-4/junior college/associates	64 (10.2%)
Bachelor degree	322 (51.4%)
Post-graduate/professional	34 (5.4%)
Household size	4.241 (2.152)

	Summary
Full-time employed	
No	224 (35.7%)
Yes	403 (64.3%)
Place of residence	
Urban area	502 (80.1%)
Rural area	125 (19.9%)
Resides in Java island	
Outer Java region	180 (28.7%)
Java region	447 (71.3%)
Income level	
0 - 3,499,999 IDR	112 (18.1%)
3,500,000 - 7,499,999 IDR	201 (32.5%)
7,500,000 - 12,499,999 IDR	150 (24.2%)
12,500,000 - 19,999,999 IDR	98 (15.8%)
20,000,000 IDR or higher	58 (9.4%)

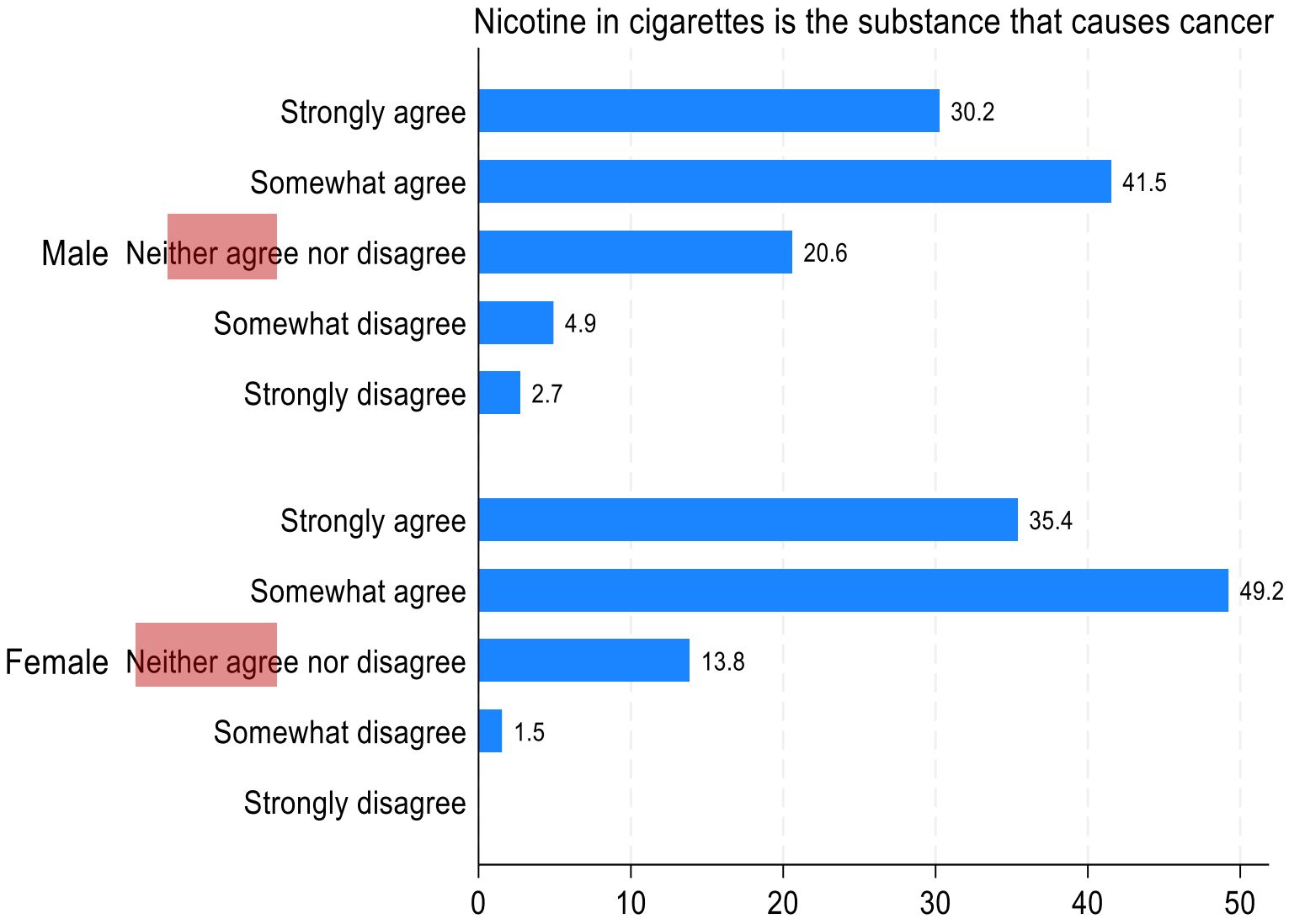
RESULTS – Perceptions



Source:
IDF DCE Survey 2023

There is a general tendency for both male and female respondents to view e-cigarettes as either just as harmful or more harmful than traditional cigarettes,

RESULTS – Perceptions (cont'd)



Evidence of misperceptions of nicotine and health effects of e-cigarettes in Indonesia

RESULTS – Estimation results of linear probability models

Variables		Immediate choice today			Choice of 6 months from now		
		Cigarette	E-cigarette	Quit	Cigarette	E-cigarette	Quit
Price	Cigarette price	**-0.00177****	**0.00165****	0.00012	**-0.00207****	**0.00217****	-0.0001
		(0.00052)	(0.00050)	(0.00026)	(0.00053)	(0.00050)	(0.00028)
	E-cigarette price	**0.00369****	**-0.00423****	**0.00054****	**0.00293****	**-0.00352****	**0.00059****
		(0.00044)	(0.00042)	(0.00023)	(0.00045)	(0.00043)	(0.00024)
E-cigarette available flavor	Fruit/sweet/candy	-0.00651	0.01046	-0.00395	-0.00052	0.00692	-0.00641
		(0.01355)	(0.01291)	(0.00688)	(0.01376)	(0.01315)	(0.00739)
	Menthol	0.00479	-0.00091	-0.00388	0.00516	-0.0028	-0.00236
		(0.01356)	(0.01292)	(0.00689)	(0.01378)	(0.01317)	(0.00740)
E-cigarette available nicotine level	9-16 mg/ml	0.0123	-0.00468	-0.00761	0.01118	-0.00389	-0.0073
		(0.01355)	(0.01291)	(0.00688)	(0.01376)	(0.01315)	(0.00739)
	17-36 mg/ml	0.01185	-0.00891	-0.00294	-0.0051	0.00572	-0.00062
		(0.01354)	(0.01291)	(0.00688)	(0.01376)	(0.01315)	(0.00739)
N		7320	7320	7320	7320	7320	7320
R-sq		0.073	0.098	0.021	0.068	0.099	0.035

Note: The covariates include gender, age categoric, education, income, marital status, household size, dummy of live with smoker, and residential area (urban/rural). Standard errors in the parentheses. *, **, ***, and **** indicate statistical significance at the 10%, 5%, 1%, and 0.1% levels, respectively.

RESULTS – LPM (cont'd)

Variables		Gen Z			Millenial			Gen X & Others		
		Cigarette	E-cigarette	Quit	Cigarette	E-cigarette	Quit	Cigarette	E-cigarette	Quit
Price	Cigarette price	**-0.00141****	**0.00130****	0.00011	**-0.00394*****	**0.00437*****	-0.00042	**-0.00890****	-0.0005	**0.00940*****
		(0.00062)	(0.00060)	(0.00026)	(0.00118)	(0.00113)	(0.00059)	(0.00303)	(0.00286)	(0.00188)
	E-cigarette price	**0.00324*****	**-0.00338*****	0.00014	**0.00419*****	**-0.00473*****	**0.00054***	**0.00269****	**-0.00377*****	**0.00108***
		(0.00095)	(0.00092)	(0.00041)	(0.00057)	(0.00054)	(0.00028)	(0.00101)	(0.00096)	(0.00063)
E-cigarette available flavor	Fruit/sweet/candy	0.0261	-0.0157	-0.0104	-0.0224	0.02519	-0.00279	-0.0015	-0.00092	0.00242
		(0.02886)	(0.02811)	(0.01236)	(0.01749)	(0.01662)	(0.00868)	(0.03096)	(0.02920)	(0.01917)
	Menthol	0.02934	-0.02032	-0.00902	-0.00386	0.00166	0.00219	-0.00068	0.01713	-0.01645
		(0.02897)	(0.02821)	(0.01241)	(0.01751)	(0.01663)	(0.00868)	(0.03099)	(0.02922)	(0.01919)
E-cigarette available nicotine level	9-16 mg/ml	-0.006	0.00889	-0.00289	0.01934	-0.0089	-0.01044	0.01034	-0.00691	-0.00342
		(0.02892)	(0.02816)	(0.01238)	(0.01748)	(0.01661)	(0.00867)	(0.03098)	(0.02922)	(0.01918)
	17-36 mg/ml	-0.01469	0.00391	0.01077	0.0113	-0.00449	-0.0068	0.04334	-0.03569	-0.00765
		(0.02885)	(0.02810)	(0.01236)	(0.01749)	(0.01661)	(0.00867)	(0.03097)	(0.02921)	(0.01918)
N		1680	1680	1680	4248	4248	4248	1392	1392	1392
R-sq		0.066	0.087	0.057	0.091	0.118	0.018	0.091	0.085	0.052

Note: The covariates include gender, age categoric, education, income, marital status, household size, dummy of live with smoker, and residential area (urban/rural). Standard errors in the parentheses. *, **, ***, and **** indicate statistical significance at the 10%, 5%, 1%, and 0.1% levels, respectively.

RESULTS – Estimation of marginal effects using logistic regression models

Variables		Immediate choice today			Choice of 6 months from now		
		Cigarette	E-cigarette	Quit	Cigarette	E-cigarette	Quit
Price	Cigarette price	**-0.00180****	**0.00163****	0.000212	**-0.00219****	**0.00227****	-0.000264
		(3.29)	(3.25)	(0.71)	(3.69)	(4.02)	(0.53)
	E-cigarette price	**0.00370****	**-0.00427****	**0.000533****	**0.00293****	**-0.00354****	**0.000576****
		(8.40)	(10.14)	(2.39)	(6.55)	(8.24)	(2.42)
E-cigarette available flavor	Fruit/sweet/candy	-0.00628	0.01	-0.00383	-0.000388	0.0066	-0.00645
		(0.47)	(0.78)	(0.56)	(0.03)	(0.50)	(0.87)
	Menthol	0.00503	-0.00134	-0.00384	0.00531	-0.00309	-0.0023
		(0.37)	(0.10)	(0.56)	(0.39)	(0.23)	(0.32)
E-cigarette available nicotine level	9-16 mg/ml	0.0121	-0.00439	-0.00771	0.0111	-0.00373	-0.00745
		(0.90)	(0.34)	(1.12)	(0.81)	(0.28)	(1.00)
	17-36 mg/ml	0.0118	-0.00896	-0.00289	-0.00515	0.00571	-0.000668
		(0.87)	(0.70)	(0.43)	(0.38)	(0.44)	(0.09)
N		7320	7320	7320	7320	7320	7320

Note: The covariates include gender, age categoric, education, income, marital status, household size, dummy of live with smoker, and residential area (urban/rural). Standard errors in the parentheses. *, **, ***, and **** indicate statistical significance at the 10%, 5%, 1%, and 0.1% levels, respectively.

RESULTS – McFadden's Conditional Logit Choice Model

Variables	Immediate Choice Today				Choice of 6 Months from Now			
	Raw	Odd Ratio	Raw	Odd Ratio	Raw	Odd Ratio	Raw	Odd Ratio
Flavor	-0.0346	0.966	-0.0298	0.971	-0.0214	0.979	-0.0164	0.984
	-0.0301	-0.0291	-0.03	-0.0291	-0.0295	-0.0289	-0.0294	-0.0289
Nicotine Level	0.00754	1.008	0.0103	1.01	0.00369	1.004	0.00628	1.006
	-0.0301	-0.0303	-0.03	-0.0303	-0.0295	-0.0296	-0.0294	-0.0296
ln_price	-0.246***	0.782***			-0.253***	0.776***		
	-0.0232	-0.0181			-0.0229	-0.0178		
Price/10000			-0.0141***	0.986***			-0.0130***	0.987***
			-0.00165	-0.00163			-0.00163	-0.0016
E_cigarette								
_cons	-0.0475	0.954	-0.279**	0.756**	0.113	1.12	-0.155	0.856
	-0.0988	-0.0942	-0.0927	-0.0701	-0.0974	-0.109	-0.0911	-0.078
Quit								
_cons	-4.770***	0.00848***	-2.308***	0.0995***	-4.553***	0.0105***	-2.014***	0.133***
	-0.243	-0.00206	-0.0486	-0.00484	-0.239	-0.00252	-0.0445	-0.00594
N	22572	22572	22572	22572	22572	22572	22572	22572

RESULTS – McFadden's Conditional Logit Choice Model (quit base alternative)

Variables	Immediate Choice Today				Choice of 6 Months from Now			
	Raw	Odd Ratio	Raw	Odd Ratio	Raw	Odd Ratio	Raw	Odd Ratio
Flavor	-0.0346	0.966	-0.0298	0.971	-0.0214	0.979	-0.0164	0.984
	-0.0222	-0.0214	-0.0219	-0.0213	-0.0206	-0.0201	-0.0203	-0.02
Nicotine Level	0.00754	1.008	0.0103	1.01	0.00369	1.004	0.00628	1.006
	-0.0197	-0.0199	-0.0196	-0.0198	-0.0191	-0.0191	-0.019	-0.0191
ln_price	-0.246***	0.782***			-0.253***	0.776***		
	-0.0565	-0.0442			-0.0552	-0.0428		
Price/10000			-0.0141***	0.986***			-0.0130***	0.987***
			-0.00362	-0.00357			-0.00311	-0.00307
Cigarette								
_cons	4.770***	117.9***	2.308***	10.05***	4.553***	94.93***	2.014***	7.494***
	-0.597	-70.37	-0.127	-1.28	-0.582	-55.22	-0.123	-0.925
E_cigarette								
_cons	4.722***	112.4***	2.028***	7.600***	4.666***	106.3***	1.859***	6.417***
	-0.705	-79.3	-0.163	-1.241	-0.689	-73.22	-0.156	-1.001
N	22572	22572	22572	22572	22572	22572	22572	22572

Variables	Immediate Choice Today				Choice of 6 Months from Now			
	Raw	Odd Ratio	Raw	Odd Ratio	Raw	Odd Ratio	Raw	Odd Ratio
Alt								
Flavor	-0.0368	0.964	-0.0317	0.969	-0.0228	0.977	-0.0175	0.983
	-0.0236	-0.0228	-0.0233	-0.0226	-0.022	-0.0215	-0.0217	-0.0214
Nicotine Level	0.00771	1.008	0.0112	1.011	0.00363	1.004	0.00686	1.007
	-0.021	-0.0212	-0.0209	-0.0211	-0.0204	-0.0205	-0.0204	-0.0206
ln_price	-0.259***	0.772***			-0.267***	0.766***		
	-0.0542	-0.0418			-0.0529	-0.0405		
Price/10,000			-0.0156***	0.985***			-0.0143***	0.986***
			-0.00366	-0.0036			-0.0032	-0.00316
Cigarette								
dummy male	-0.00177	0.998	-0.0516	0.95	0.132	1.141	0.0753	1.078
	-0.483	-0.482	-0.487	-0.462	-0.494	-0.563	-0.497	-0.536
Age by Generations (Gen Z baseline)								
Gen. millennials	-0.279	0.756	-0.27	0.763	-0.237	0.789	-0.223	0.8
	-0.347	-0.262	-0.346	-0.264	-0.33	-0.26	-0.329	-0.263
Gen. X & older	-0.704	0.495	-0.676	0.509	-0.688	0.503	-0.654	0.52
	-0.369	-0.183	-0.368	-0.187	-0.358	-0.18	-0.357	-0.186
dummy full-time employed	0.981***	2.668***	0.958***	2.606***	1.043***	2.838***	1.015***	2.760***
	-0.263	-0.701	-0.263	-0.685	-0.25	-0.711	-0.251	-0.692
dummy higher education	-0.496	0.609	-0.492	0.612	-0.528*	0.590*	-0.518*	0.595*
	-0.271	-0.165	-0.27	-0.165	-0.25	-0.148	-0.249	-0.148
_cons	5.026***	152.3***	2.484***	11.99***	4.655***	105.1***	2.032***	7.632***
	-0.783	-119.2	-0.552	-6.622	-0.766	-80.51	-0.564	-4.306
E_cigarette								
dummy male	-0.765	0.465	-0.804	0.447	-0.693	0.5	-0.733	0.481
	-0.497	-0.231	-0.501	-0.224	-0.493	-0.247	-0.498	-0.239
Age by Generations (Gen Z baseline)								
Gen. millenials	-0.788*	0.455*	-0.789*	0.455*	-0.784*	0.456*	-0.783*	0.457*
	-0.359	-0.163	-0.359	-0.163	-0.332	-0.151	-0.331	-0.152
Gen. X & older	-1.142**	0.319**	-1.136**	0.321**	-1.244***	0.288***	-1.235**	0.291**
	-0.398	-0.127	-0.399	-0.128	-0.377	-0.109	-0.377	-0.11
dummy full-time employed	1.285***	3.615***	1.285***	3.616***	1.335***	3.800***	1.333***	3.793***
	-0.275	-0.993	-0.275	-0.996	-0.259	-0.986	-0.26	-0.987
dummy higher education	0.33	1.391	0.335	1.397	0.285	1.33	0.288	1.334
	-0.286	-0.397	-0.286	-0.399	-0.265	-0.353	-0.265	-0.353
_cons	5.268***	194.1***	2.477***	11.91***	5.181***	177.9***	2.270***	9.680***
	-0.869	-168.6	-0.59	-7.024	-0.835	-148.6	-0.582	-5.63
N	22572	22572	22572	22572	22572	22572	22572	22572

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RESULTS – McFadden Conditional Logit Analysis (quit base alternative)

RESULTS - Hypothesis 1 testing

- Own and Cross Price Elasticity:
  - Higher C-cig price corresponds to lower likelihood of choosing C-cig, and higher likelihood of choosing E-cig
  - Higher E-cig price corresponds to lower likelihood of choosing E-cig, and higher likelihood of choosing C-cig

- Six months from now
  - Do not show a significant difference in terms of direction compared to the immediate choice now
  - However, higher probability of quitting smoking because of the e-cig price increase→ survey results reported that 58.1% intended to quit in the next 6 months

RESULTS - Hypothesis 1 testing (cont'd)

- Attributes effect by Age
  - For Gen Z, the effect of price increases on cigarettes and e-cigarettes does not show a significant probability of quitting smoking.
  - For Millennials, the impact is similar to the general model concerning own-price and cross-price elasticity, with the possibility of quitting smoking if e-cigarette prices rise.
  - For Gen X and others, price increases in cigarettes and e-cigarettes present a probability of quitting smoking, with a greater magnitude than in younger age groups. And this age group is less likely to consider switching to e-cigarettes.

RESULTS - Hypothesis 2 and 3 testing

- Flavor and nicotine levels did not show a significant impact

RESULTS – Estimation results of linear probability models on sociodemographic covariates

Variables	Cigarette	E-cigarette	Quit
Urban (1=Yes)	0.00478	0.04897***	-0.05375****
	-0.01598	-0.01523	-0.00812
Female (1=Yes)	-0.11596****	0.12287****	-0.00691
	-0.01934	-0.01843	-0.00982
Age generation			
Millenial	0.13799****	-0.17067****	0.03268****
	-0.01593	-0.01518	-0.00809
Gen X & Others	0.11503****	-0.19370****	0.07866****
	-0.01991	-0.01897	-0.01011
	-0.01991	-0.01897	-0.01011
College/university (1=Yes)	-0.09214****	0.08858****	0.00356
	-0.01353	-0.0129	-0.00687
Marital status			
Never married	0.02617	-0.07324****	0.04707****
	-0.01664	-0.01585	-0.00845
Other	0.01107	-0.00808	-0.00299
	-0.03475	-0.03311	-0.01765
Household Size	-0.00387	0.00809***	-0.00421***
	-0.00283	-0.0027	-0.00144
Live with smoker	0.01071	0.00604	-0.01675***
	-0.01229	-0.01171	-0.00624
Income			
3,500,000 - 7,499,999 IDR	-0.08874****	0.07811****	0.01064
	-0.01758	-0.01675	-0.00893
7,500,000 - 12,499,999 IDR	-0.15883****	0.14629****	0.01254
	-0.02054	-0.01957	-0.01043
12,500,000 - 19,999,999 IDR	-0.23270****	0.20851****	0.02419**
	-0.02275	-0.02168	-0.01156
20,000,000 IDR or higher	-0.25800****	0.27592****	-0.01792
	-0.02569	-0.02448	-0.01305
N	7320	7320	7320

Gender

- Female respondents more likely to choose e-cigarettes. There is no significant effect for females on quitting behavior.

Age Generation

- Millennials and Gen X & Others are both more likely to smoke cigarettes. Older generations are more inclined to quit smoking compared to younger cohorts.

Education (College/University)

- Higher education may encourage the use of alternative nicotine products, possibly due to greater awareness of health risks.

Income

- Higher-income increases the likelihood of choosing e-cigarettes.

Note: The covariates include attributes of DCE. Standard errors in the parentheses. *, **, ***, and **** indicate statistical significance at the 10%, 5%, 1%, and 0.1% levels, respectively.

DISCUSSION

Price Sensitivity and Potential Health Risks

- Indonesian tobacco products consumers are price-sensitive. This indicates that price interventions could effectively influence consumer behavior.
- By making e-cig more financially attractive compared to c-cig, smokers might be incentivized to switch, or as a means for transition to smoking cessation. This potentially reduces the health risks and burden associated with smoking.
  - Switching from C-cig to E-cig may help decrease health risks (Chan et al., 2019; Ab Rahman, et al., 2019; WHO, 2019). E-cig may be more efficacious than nicotine replacement therapy for smoking cessation (Chan et al., 2019)
- Similarly, the significant negative relationship between c-cig price and e-cig choice indicates that lower prices for e-cig could promote their use over c-cig.
  - In Malaysia, nearly 90% of e-cig users were either current or former c-cig smokers (Ab Rahman et al., 2019) .
- E-cig should not be used by youth and young adults.
- Increasing prices may create externalities in the form of increased illicit trade

CONCLUSION

- **Price as a Determinant**
  - Higher cigarette prices effectively reduce smoking rates; price controls (e.g., taxes) are crucial.
- **Substitution Effect**
  - Consumers tend to switch to e-cigarettes as cigarette prices increase.
- **Demographic Insights**
  - Younger consumers (Gen Z) prefer switching to e-cigarettes over quitting.
  - Older consumers are more likely to quit smoking due to price increases.

Limitations:

- Need for further research on long-term effects and diverse population groups.
- Reliance on self-reported data may introduce biases.

POLICY IMPLICATIONS

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Public Health Policy

- Policymakers should consider adjusting prices on c-cig and e-cig through tax policies to influence smoking behavior. For instance:
- Even though the LPM and Logistic Regression do not find the significance of other variables (flavors and nicotine level) in affecting smoking behavior, the THRP should not rely solely on pricing strategies.
  - More comprehensive measures including public campaigns, smoking cessation programs, advertising restrictions, and smoke-free policies are crucial.
  - To ensure the safety and efficacy of e-cig as a harm reduction instrument, the THRP should include regulations on product standards, advertisement practices, and usage restrictions, particularly among youth and non-smokers.
  - Limit flavors that appeal to youth (Gen Z, especially those are in school age), such as fruit, candy, and other sweet flavors, while allowing those that can help adults quit smoking.

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THANK YOU