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SHİFTİNG PATTERNS OF FRUİT AND VEGETABLE CONSUMPTİON BEHAVİOR İN CENTRAL JAVA PROVİNCE, INDONESİA*

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ABSTRACT

A Rapid shift in consumer behavior highlights the importance of studying intentions and behaviors in fruit and vegetable consumption. Indonesia, despite being a tropical country rich in fruit and vegetable resources, continues to exhibit low levels of fruit and vegetable consumption, falling below the national Balanced Nutrition Guidelines. A survey instrument was developed based on constructs from the Theory of Planned Behavior (TPB) and administered to 225 respondents from upper-middle economic backgrounds. The primary method utilized was Structural Equation Modeling (SEM). The results indicate that pears and carrots are the most frequently consumed fruit and vegetable, with average daily intakes of 126.9 grams and 100.1 grams, respectively. However, the average consumption of overall fruit and vegetables is only 57.26 grams/day and 58.12 grams/day. The R^2 values on the moderation variable (intention) and behavior were 0.66 and 0.71. Attitude, subjective norms, and PBC were significant predictors for all three health behaviors. TPB explains that repeated intensity can shape behavior influenced by surrounding beliefs, such as family beliefs. Notably, 98% of respondents cited limited time to prepare meals, indicating a strong preference for ready-to-eat options. The findings highlight a behavioral shift influenced by modern lifestyle changes, such as individualism and time constraints, with perceived behavioral control emerging as the most influential factor in shaping both consumption intention and behavior. Unlike traditional reliance on social norms, consumers now prioritize ease of access, affordability, and preparation efficiency. The results of this study are beneficial for public policy planning and market and economic demand forecasting for fruit and vegetable consumption in the long term. Additionally, product innovation and marketing approaches are also significant considerations. The approach to maintaining the health of individuals vulnerable to obesity and diabetes is no longer communal or family-based but rather personal.

Keywords: Consumer behavior, Intentions, Perceived behavior control, Shifting, Sustainable consumption.

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INTRODUCTION

Public health authorities have long advocated for the consumption of fruits and vegetables (FVI) as a critical component of a healthy diet (WHO, 2003; USDA/USDHHS, 2010). The World Health Organization recommend consuming at least 400 g of fruits and vegetables daily as the minimum amount to prevent chronic diseases and obesity (WHO, 2003). Along with the improvement in living standards and public awareness of food safety, fruit and vegetable consumption should increasingly gain consumers' attention and consideration (Li *et al*., 2023). However, fruit and vegetable consumption remains lower than recommended balanced nutrition guidelines. In developed countries, such as the UK, it reaches 41% (UK National Diet and Nutrition, 2012); in the US 52% (US Department of Agriculture, 2016); and in Australia only 50% (Australia Bureau Statistic, 2012). The situation is worse in developing countries, such as Malaysia, where fruit and vegetable consumption is 15%; Laos, 21%; and Indonesia, only 10% (WHO, 2003; Basic Health Research (Balitbang Kemenkes), 2013). Several factors contribute to the low consumption of fruits and vegetables, including perceived lower accessibility and higher price of fruit and vegetables (Dharmayani *et al*., 2024), availability of sugary drinks (Okop *et al*., 2019), increased availability of convenience and fast foods (Nicklas *et al*., 2001), and the quality of green vegetables not meeting consumer expectations (Wu *et al*., 2019; Yin *et al*., 2022). Although biodiversity is abundant in Indonesia, the agricultural sector in Indonesia is still in the development stage (Firdauzi *et al*., 2024). This trend is unsustainable, as fruit and vegetable consumption has been proven to prevent chronic diseases, including cardiovascular diseases and certain types of cancer (Gortmaker *et al*., 1999; Slusser *et al.,* 2007). As a daily staple food, vegetables provide various essential nutrients for human health, including protein, dietary fiber,

vitamins, and minerals (Cheng *et al*., 2016; Li *et al*., 2023).

A multitude of studies has examined the influence of various factors on cognition, consumption intentions, and behaviors related to green vegetables (Cheng *et al*., 2016; Rana and Paul, 2017; Riccioli *et al*., 2020; Yin *et al*., 2022). The Theory of Planned Behavior (TPB) explains significant variations in perceived intention and behavior. Perceived behavioral control (PBC), subjective norms, and attitude toward the behavior all affect intention. PBC helps predict behavior as well as intention. Healthy eating is one of the many behaviors to which the TPB has been successfully applied (Conner *et al*., 2002; McEachan *et al*., 2011), dietary behaviors (Armitage *et al*., 1999; Brouwer *et al.,* 2015) and fruit and vegetable consumption (e.g., Blanchard *et al*., 2009; Godin *et al*., 2010). The Theory of Planned Behavior (TPB), derived from the earlier framework of the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980), is an appropriate theoretical approach to consider behavior, as it allows for the identification of beliefs relevant to fruit and vegetable consumption behaviors in specific contexts. Other theories applied to the consumption patterns of fruits and vegetables include the TPB, which examines beliefs, attitudes, and knowledge related to consumption behaviors (Bandura, 1986), and the Ecological Systems Theory, which explores individual, family, and community factors influencing consumption patterns (Ajzen and Fishbein, 1980). The primary methods for determining intentions or behaviors regarding vegetable and fruit consumption include structural equation models, logistic models, and probit models (Dorce *et al*., 2021; Yin *et al*., 2022). Structural equation modeling is frequently utilized to examine the interactions of moderator or mediator variables in hypothesized pathways to explore the deeper mechanisms of vegetable consumption behaviors (Li *et al*., 2023).

Fruit and vegetable consumption primarily depends on consumer attitudes, which, in the long term, develop into behaviors and habits. A theory relevant to comprehensively studying individual behavior from attitudes and intentions to actions is the Theory of Planned Behavior (TPB). As the theoretical reference model, the Theory of Planned Behavior (Ajzen, 1991) was used. The intention to carry out a behavior is its immediate antecedent, according to TPB. Perceived behavioral control (PBC), subjective norms, and attitude toward the behavior all affect intention. Intention represents a person’s readiness to perform the behavior in question (Conner *et al*., 2007) and is, in turn, predicted by two constructs: attitude toward the behavior and subjective norms regarding the behavior. Attitudes are defined as the extent to which an individual perceives a behavior as favorable or unfavorable, based on their beliefs concerning the outcomes of that behavior and the evaluation of those outcomes (Fishbein and Ajzen, 2010). Subjective norms, in contrast, refer to perceptions of social pressure to engage in the behavior, which arise from a person's beliefs about whether others want them to engage in the behavior, whether others engage in the behavior, and their motivation to comply (Emanuel *et al*., 2012). Perceived behavioral control (PBC) is considered to influence both intention and behavior. The rationale for including PBC in the model was to enable the prediction of behaviors that are not entirely under volitional control. Specifically, the relationship between PBC and behavior tends to be stronger when intention (rather than self-prediction) measures are used, as intention measures do not account for facilitating or inhibiting factors (Armitage, 2010a). However, subjective norms generally have the weakest relationship with behavioral intention, ranging from small to medium effects, compared to the medium to large effects observed for other variables (Murnaghan *et al*., 2010; Conner *et al*., 2005; Armitage *et al*., 2010a).

Fruit and vegetable consumption in Indonesia remains below the standards set by the Balanced Nutrition Guidelines, with a declining per capita trend in several types of vegetables reaching up to a 5.18% decrease annually. However, certain vegetables, such as napa cabbage, have shown an annual increase of 3.4% (Central for Agricultural Data and Information System, 2023). Consumer behavior patterns are currently shifting rapidly due to the influence of digitalization, socio-economic changes, and aggressive market innovations. As a result, limited increases in consumption do not yet reflect sustainable behavioral change. This phenomenon also applies to fruit and vegetable consumption, raising a critical question: how can we gain a deeper understanding of the psychological factors that influence consumption intentions and behaviors in an era of accelerated behavioral shifts? Key constructs such as attitudes, perceived behavioral control, and perceived norms (Fishbein and Ajzen, 2010) must be examined in this context. Therefore, this study is essential to formulate more effective behavioral interventions by applying the Theory of Planned Behavior (TPB) framework to promote long-term improvements in fruit and vegetable consumption. To the researchers' knowledge, studies focusing on forming intentions and behaviors in specific cases among adult age groups constrained by income are still rare, except for research conducted on teenagers and schoolchildren (Prelip *et al*., 2011; Papadaki *et al*., 2007). The novelty of this study focuses on studying the fruit and vegetable consumption patterns of the middle-class community, which in 2024 will be 66.35% of the total population of Indonesia (BPS, 2024). Therefore, the shift in consumption patterns and the factors causing it have a crucial role as a buffer for the national economy.

MATERIALS AND METHODS

The respondents in this study were residents of Central Java Province with a minimum income of IDR 2,038,005, referring to the minimum wage list for the 35 Regencies/Cities in Central Java Province (Central Java Governor's Decree No. 561/57 of 2023). The sampling technique used at these sales locations was a non-probability sampling method, a purposive sampling type, as not everyone in the population at the specified locations had an equal chance of being included as a sample in this study (Plano Clark, 2016). There are several specific criteria determined by the researcher, namely: (1) Respondents belong to the middle-income class (with a minimum income of IDR 2,038,005), and (2) Respondents purchase fruits and vegetables from modern retail outlets and/or fruit and vegetable specialty stores. The determination of the sample size in this study was based on the Yamane Method, the population size is unknown, so it is assumed to use a population size of >100,000 with an error estimate of ±7% following Yamane's Table (1967), resulting in a sample size of 204 respondents. However, the researcher used 225 respondents to estimate the presence of invalid data.

The structured questionnaire was prepared in Indonesian, but the researchers implemented two approaches: respondents either filled out the questionnaire independently or were guided by enumerators in Javanese. In this study, both primary and secondary data were used. Primary data collection was conducted using several techniques, including interviews and observations in Javanese (the local language) and Indonesian, to facilitate better understanding of the research questions. Based on the balanced nutrition requirements, the participants filled out a structured questionnaire that contained sociodemographic factors and measures of the extended TPB model. The questionnaire included the kinds of fruits and vegetables that the community most frequently consumes. Fruit varieties included apples, avocados, grapes, yam beans, cantaloupes, dragon fruit, starfruit, durian, guava, oranges, longans, persimmons, mangoes, mangosteens, melons, jackfruit, pineapples, pears, papayas, bananas, rambutans, snake fruits, sapodilla, watermelons, soursop, and strawberries. Meanwhile, vegetable varieties included spinach, green beans, cassava leaves, water spinach, long beans, cucumbers, basil, cabbage, cauliflower, chayote, young jackfruit, sponge gourd, napa cabbage, mustard greens, watercress, bean sprouts, eggplant, tomatoes, and carrots. The questionnaire addressed the frequency of consumption daily, weekly, and monthly along with the reference quantities of fruits and vegetables, based on the balanced nutrition guidelines from the Indonesian Minister of Health Regulation No. 41 of 2014.

Statistical Data Analysis Structural Equation Modeling (SEM): Outer Model (Measurement Model), explains the relationship between indicators (question items) and latent constructs (latent variables). The variables are described in the questions below:

Table 1. Determination of sampling size using the Yamane's Table

Size of population	Sample size (n) for precision (e) of:			
	±3%	±5%	±7%	±10%
500	A	222	145	83
600	A	240	152	86
700	A	255	158	88
800	A	267	163	89
900	A	277	166	90
1.000	A	286	169	91
2.000	714	333	185	95
3.000	811	353	191	97
4.000	870	364	194	98
5.000	909	370	196	98
6.000	938	375	197	98
7.000	959	378	198	99
8.000	976	381	199	99
9.000	989	383	200	99
10.000	1.000	385	200	99
15.000	1.034	390	201	99
20.000	1.053	392	204	100
25.000	1.064	394	204	100
50.000	1.087	397	204	100
100.000	1.099	398	204	100
>100.000	1.111	400	204	100

a = assumption of normal population is poor. The entire population should be sampled.

Source: (Yamane, 1967)

Indicator Reliability: Based on the rule of thumb, the loading factor value must be greater than 0.7 and the p-value must be less than 0.1. The loading factor values shown in the table range from 0.71 to 1,000. The p-value obtained is <0.001 and meets the requirements of a p-value <0.1, so based on the values obtained, all indicators are suitable for measuring each variable construct.

Internal Consistency Reliability: Construct reliability and has a requirement that has a value >0.7. Along with the composite reliability value, you can also see the Cronbach's alpha value with the criteria >0.6. According to the table, the composite reliability value for all constructs is greater than 0.7, indicating that the measurement model is reliable or that the indicators have been successful in measuring each latent variable (construct). Each indicator is able to measure the consistency of the variables used. The Cronbach's alpha value in the table shows that each variable already has a value of more than 0.7. The resulting value shows that all constructs are internally consistent and reliable.

Convergent validity: The rule of thumb requirement that is usually used is that the Average Variance Extracted

(AVE) must be greater than 0.5. Based on the table, the Average Variance Extracted (AVE) value of all latent variables (constructs) has a value of >0.5. The data shows that the AVE value of each construct is greater than 0.5 or greater than 50%. This value indicates that the indicator has a lower average error rate so that the convergent validity measure is good or is said to have met the convergent validity criteria (Vinzi *et al.*, 2010).

Discriminant validity: A model is considered to have good discriminant validity if its AVE square root value is greater than the correlation value between constructs; according to the table, the AVE square root in the diagonal column marked with bold brackets and is greater than the correlation between latent constructs in the same column; the analysis's findings indicate that the variables of attitude, subjective norms, behavioral control, intention, and behavior have a higher square root value than the correlation value with other variables (Chin, 2012).

Table 2. Research Variables

Variable	Description
X1 (Subjective Norm)	
X1.2	I eat fruits and vegetables because I am inspired by close friends / artists / influencers / content on social media
X1.3	I eat fruits and vegetables because I apply the knowledge taught at school/campus/courses/beauty clinics etc.
X1.4	I eat fruits and vegetables because I am following a diet program from my health coach.
X1.5	I consume fruits and vegetables because they are sometimes provided/given by other people (office events, relatives, campus events, etc.)
X2 (Perceived Behavior Control)	
X2.1	I consume fruits and vegetables because they are easy to access (shops are available/close by)
X2.2	I consume fruits and vegetables because the products are always available
X2.3	I eat fruits and vegetables because I can afford them
X3 (Attitude)	
X3.3	I consume fruits and vegetables considering other health aspects (brightening skin, etc.)
X3.5	I consume fruits and vegetables because they can increase my appetite
Intention (Moderate)	I plan to consume fruits and vegetables per day
Behavior (Y)	Average frequency of fruit and vegetable consumption per day* *(selected based on the grammage range listed in the Balanced Nutrition Guidelines in the Regulation of the Minister of Health of the Republic of Indonesia No. 41 of 2014)

Table 3. Combined Loadings and Cross Loadings

Indicator	Subjective Norm (X1)	Perceived Behavior (X2)	Attitude (X3)	Intention (Moderate)	Behavior (Y)	p value	Reliability
X1.2	**(0.736)**	0.080	-0.107	0.554	-0.541	<0.001	Reliable
X1.3	**(0.744)**	0.019	0.062	-1.267	1.278	<0.001	Reliable
X1.4	**(0.742)**	0.163	0.000	-0.120	0.297	<0.001	Reliable
X1.5	**(0.799)**	-0.251	0.088	1.223	-1.463	<0.001	Reliable
X2.1	-0.029	**(0.820)**	0.030	0.573	-0.506	<0.001	Reliable
X2.2	-0.036	**(0.808)**	0.027	1.089	-1.103	<0.001	Reliable
X2.3	0.229	**(0.739)**	-0.043	0.960	-1.135	<0.001	Reliable
X3.3	0.019	-0.116	**(0.712)**	-1.162	1.201	<0.001	Reliable
X3.5	-0.036	-0.008	**(0.705)**	0.010	0.011	<0.001	Reliable
Intention	0.000	0.000	0.000	**(1.000)**	0.000	<0.001	Reliable
Behavior	0.000	0.000	0.000	0.000	**(1.000)**	<0.001	Reliable

Source: (Primary data, 2024)

Table 4. Internal Consistency Reliability

Construct	Consistency Reliability	Cronbach's α≥0.6
Subjective Norm (X1)	0.733	0.630
Perceived Behavior (X2)	0.801	0.689
Attitude (X3)	0.707	0.679
Intention (Moderate)	1.000	1.000
Behavior (Y)	1.000	1.000

Table 5. Convergent Validity

Construct	*Average Variance Extracted (AVE)*
Subjective Norm (X1)	0.530
Perceived Behavior (X2)	0.557
Attitude (X3)	0.547
Intention (Moderate)	1.000
Behavior (Y)	1.000

Source: (Primary data, 2024)

Table 6. Discriminant validity

	Subjective Norm (X1)	Perceived Behavior (X2)	Attitude (X3)	Intention (Moderate)	Behavior (Y)
Subjective Norm (X1)	**(0.575)**	0.094	0.093	-0.033	0.003
Perceived Behavior (X2)	0.094	**(0.676)**	0.253	-0.067	-0.105
Attitude (X3)	0.093	0.253	**(0.669)**	-0.054	-0.062
Intention (Moderate)	-0.033	-0.067	-0.054	**(1.000)**	0.920
Behavior (Y)	0.003	-0.105	-0.062	0.920	**(1.000)**

Source: (Primary data, 2024)

Inner Model (Structural Model), explain the relationship between latent constructs

The statistical hypothesis for the inner model for the influence of endogenous latent variables on endogenous latent variables is:

H0 = βi=0

$H_{1,2,3,4,5}$ = $\beta i \neq 0$

Note:

H1 → Subjective norms of consuming fruit and vegetables have a positive effect on the intention

H2 → Perceived behavior control of consuming fruit and vegetables have a positive effect on the intention

H3 → Attitude of consuming fruit and vegetables have a positive effect on the intention

H4 → Intentions of consuming fruit and vegetables have a positive effect on the behavior

H5 → Perceived behavior control of consuming fruit and vegetables have a positive effect on the behavior

RESULTS

The respondents in this study were characterized by 64% being female, who typically have control over household nutritional intake. From another perspective, it has been noted that women are more likely to consume fruits and vegetables than men to meet nutritional needs (Emanuel *et al*., 2012). According to the table below, the most frequently consumed fruits with the highest average daily consumption are pears at 126.895 grams/day, pineapples at 119.305 grams/day, and papayas at 83.1 grams/day. For vegetables, the highest average daily consumption is carrots at 100.06 grams/day, tomatoes at 93.2 grams/day, and spinach at 79.16 grams/day. It is important to note that the respondents represent consumers with a minimum income level of IDR 2,038,005, indicating a relatively adequate level of well-being. However, in order to prevent obesity and chronic diseases, the Food and Agriculture Organization (WHO) and the World Health Organization (2003) advise eating at least 400 grams of fruits and vegetables daily.

Overall, the average total consumption was 57.26 grams/day for fruit and 58.12 grams/day for vegetables. The highest level of fruit consumption even only reaches 32% of the recommended consumption of 400 grams per day for each individual. This shows that the behavior of vegetable and fruit consumption in society is still low and reflects inadequate consumption of fruits and vegetables.

The results of the analysis using SEM on the TPB Model show that the Subjective Norm variable (X1) has the smallest influence of 0.16 compared to Attitude (X3) of 0.28 and Perceived Behavior (X2) of 0.33 on Intention. In addition, perceived behavior can directly influence behavior without going through intention with a value of 0.22. Variables X1, X2, and X3 have an influence on Intention of 0.66 or 66% of the model with the other 34% influenced by variables not examined in this study. While the influence of Variables X1, X2, X3 through Intention on Behavior is 0.71 or 71% with the other 29% influenced by factors outside the model.

Table 7. Average amount of fruit and vegetable consumption per day per person

Fruits	Average consumption (grams/day)	Vegetables	Average consumption (grams/day)
Apple	67.4 ± 31.5	Amaranth	79.1 ± 37.0
Avocado	67.7 ± 40.4	Cowpea	60.8 ± 41.9
Grape	76.9 ± 60.2	Cassava leaves	38.1 ± 40.9
Jicama	28.5 ± 41.3	Kangkoong	73.8 ± 38.9
Cantaloupe	24.0 ± 32.5	Yard Long beans	45.6 ± 42.5
Dragon fruit	60.3 ± 43.1	Cucumber	50.1 ± 47.6
Star fruit	40.7 ± 49.0	Basil	32.7 ± 35.5
Durian	37.4 ± 32.2	Cabbage	60.5 ± 39.7
Guava	52.4 ± 46.1	Cauliflower	66.8 ± 41.4
Orange	82.8 ± 42.9	Chayote	53.8 ± 50.5
Longan	74.8 ± 61.1	Young jackfruit	31.7 ± 40.1
Persimmon	26.4 ± 45.3	Luffa	47.4 ± 48.2
Mango	88.1 ± 45.5	Chinese Cabbage	60.2 ± 45.0
Mangosteen	21.9 ± 21.7	Canola	63.3 ± 39.9
Melon	79.1 ± 41.6	Watercress	40.6 ± 43.4
Jackfruit	17.9 ± 21.7	Bean sprouts	51.1 ± 44.6
Pineapple	119.3 ± 83.7	Eggplant	54.4 ± 41.8
Pears	126.8 ± 80.3	Tomatoes	93.2 ± 40.4
Pawpaw	83.1 ± 49.3	Carrots	100.1 ± 39.7
Banana	48.0 ± 18.2	**Total Average**	**58.12**
Rambutan	36.2 ± 37.8		
Skin Snakefruit	41.7 ± 36.0		
Sapodilla	25.3 ± 32.1		
Watermelon	78.3 ± 34.1		
Soursop	42.3 ± 51.2		
Strawberries	40.5 ± 42.1		
Total Average	**57.26**		

Source: (Primary data, 2024)

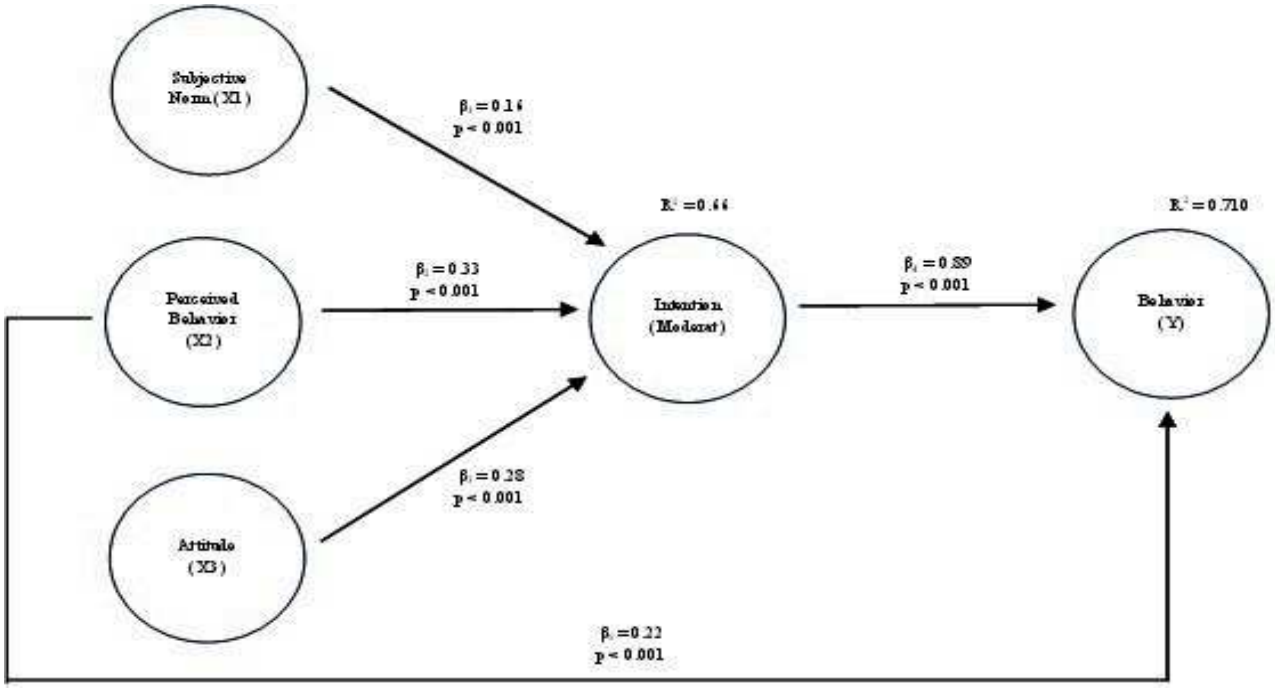

Figure 1. TPB Model

Table 8. Indicators of the most influential variables in the model

Variable	Indicator	Loading Factor
Subjective Norms (X1)	I consume fruits and vegetables because they are sometimes provided/given by other people (office events, relatives, campus events, etc.)	0,799
Perceived Behavior (X2)	I consume fruits and vegetables because they are easy to access (shops are available/close by)	0,820
Attitude (X3)	I consume fruits and vegetables considering other health aspects (brightening skin, etc.)	0,712
Intention (moderate)	I plan to consume fruits and vegetables per day	1,000
Behavior (Y)	Average frequency of fruit and vegetable consumption per day	1,000

Based on Table 8, the dominant factors that influence the intention and behavior of middle-class people in consuming fruit and vegetables can be identified.

DISCUSSION

Subjective Norms (X1): The low level of fruit and vegetable consumption by the Indonesian people, especially in Central Java Province, is caused by many factors, one of which is because due to busy working. Only 2% of the total respondents are housewives and can provide sufficient fruit and vegetable nutrition for their families. However, most of the 98% of respondents stated that they did not have much time to prepare vegetable and fruit dishes for their families because of being busy working. 76% of respondents have an education level above senior high school which is assumed to have more literacy and understanding of balanced nutrition, but it turns out that the education level is not a determinant of fruit and vegetable consumption patterns. Who prepares food and habits in the family environment also provides ongoing support for food choices. In addition to the busyness factor in preparing food, the increase in consumption of ready-to-eat food and its convenience also contribute to the low consumption of fruits and vegetables. The following are indicators of several variables that cause the formation of fruit and vegetable consumption behavior. The influence of close friends, influencers, expert recommendations, and diet program suggestions contributes to the intention to consume fruits and vegetables. However, this influence is not particularly strong, as fruits and vegetables are still considered staple food items, and individuals tend not to be heavily influenced by social opinions regarding their consumption. This contrasts with the consumption of trendy foods and beverages, which are more strongly affected by social influence. Therefore, the highest indicator of subjective norms in influencing fruit and vegetable consumption behavior is:

"I consume fruits and vegetables because they are sometimes provided/given by other people (office events, relatives, campus events, etc.)"

The highest consumption of fruits and vegetables is influenced by individual beliefs about what is expected by those closest to them, such as support from family, friends, and coworkers. The highest consumption of fruits and vegetables is obtained from activities at the office, friends, and campus events. Based on this phenomenon, it can be used as a strategy to increase external influence that can be integrated into daily habits as part of the expected social norms. Baron and Byrne (2005) stated that subjective norms are an individual's perception of whether others will support or oppose the realization of a particular action. Subjective norms, as a social factor, are defined as the perceived social pressure to engage or abstain from a particular behavior. Significant individuals in the respondents' lives and influential figures have been shown to positively influence their decisions regarding the consumption of fruits and vegetables (Blanchard *et al*., 2009). Subjective norms have been demonstrated to exert a significant effect on intention, although they rank last in terms of influence. This finding aligns with the conclusions reported by Blanchard *et al* (2009), who observed a minimal effect of perceived social pressure on students' consumption of five servings of fruits and vegetables per day. This finding is unsurprising, as evidence suggests that, in general, subjective norms are the weakest component of the TPB concerning intention (Armitage and Conner, 2010b). Most people consume fruits and vegetables because they are readily available and served by relatives, at office events, or during campus activities. Other studies from Menozzi *et al* (2017) have reported that parental influence is a strong predictor of the intention and actual consumption of fruits and vegetables, students living away from their family homes experienced a decline in their weekly consumption of fresh fruits, as well as raw and cooked vegetables (Papadaki *et al.*, 2007; Ha and Caine Bish., 2009; Deliens *et al.*, 2013).

Perceived Behaviour Control (X2): Data analysis results show that perceived behavioral control has a significant and positive influence on behavior. Perceived Behavior Control can directly influence behavior without going through intention because one feels capable and has control over the action. Field findings indicate that although respondents have perceived behavioral control over consuming fruits and vegetables, their consumption

levels are still below the recommended standards. Not all respondents consume fruits and vegetables daily.

"I consume fruits and vegetables because they are easy to access (shops are available/close by)"

Perceived Behavioral Control (PBC) reflects an individual's perception of the ease or difficulty of performing a particular behavior in this case, the consumption of fruits and vegetables. When individuals perceive that fruits and vegetables are easily accessible and affordable, they are more likely to feel capable of consuming them. The perception that "the products are always available" and "I can afford them" generates a strong sense of control over the behavior, thereby strengthening the intention to engage in it regularly. The availability here refers to ready-to-eat fruits and vegetables. Most respondents work, so with the convenience and availability of ready-to-eat fruits and vegetables can change consumption patterns. The average way of consuming fruits and vegetables from data analysis for fruit is eaten in the form of fresh cut fruit, while for vegetables it is processed into dishes. Unfortunately, in Indonesia, particularly in Central Java, there are still limited stores that offer ready-to-eat fruits and vegetables. Murnaghan *et al* (2010), who studied fruit and vegetable consumption among adolescents, found that perceived behavioral control can be used to predict intentions to consume fruits and vegetables. Specifically, perceived behavioral control significantly influences intentions for actual fruit and vegetable consumption. Guillaumie *et al* (2010) also support this finding, noting that perceived behavioral control can predict intentions regarding fruit and vegetable consumption.

Studies on consumption behavior among young adults in Australia suggest that while perceived behavioral control can predict intentions to consume fruits and vegetables, it does not directly impact young adults (Kothe *et al*., 2014; Mullan *et al*., 2014). The influence of perceived behavioral control on behavior, independent of intention, is often interpreted as a lack of actual control over the behavior. This effect can be attributed to the actual level of control over fruits and vegetables. Health is an essential factor in consumer food choices; however, actual food choices often do not reflect this priority (Emanuel *et al*., 2012). A busy schedule is suspected to be one of the reasons for low fruit and vegetable consumption (Houben and Jansen, 2011). Additionally, the limited variety of fruits and vegetables available in the environment is another reason for low consumption levels (De Menezes *et al*., 2018).

Attitude (X3): Consumer attitudes in consuming fruits and vegetables have not focused on the need for nutritional balance, but are more triggered by the beauty aspect. This shift in attitudes in consuming fruits and vegetables needs to be studied more deeply. Attitudes do not directly affect consumption behavior, but through the intention to consume first. The current Korean wave phenomenon which also plays a role in influencing the beauty standards of Indonesian society can make society more concerned than the issue of obesity.

"I consume fruits and vegetables considering other health aspects (brightening skin, etc.)"

The Theory of Planned Behavior model explains that attitudes have a direct influence on behavioral intentions. The formation of attitudes suggests that an individual's attitude is determined by a set of beliefs they hold about the outcomes of a given behavior (Fishbein and Ajzen, 2010). A person must believe that their behavior will have an impact. Consumer attitudes involve a positive evaluation or judgment of the belief that consuming fruits and vegetables is a good decision. Attitudes are a significant predictor of intentions toward fruit and vegetable consumption (Murnaghan *et al*., 2010; Prelip *et al*., 2011). However, attitudes significantly influence intention but do not directly affect behavior. Intention acts as a mediator between attitude and behavior (Prelip *et al*., 2011). People perceive organic branded foods and foods produced with good agricultural practices as healthier, more flavorful, and more trustworthy than other foods (Çakmakçı *et al*., 2024).

Intentions (moderate): The most important determinant of a person's decision to engage in an action is their intention. In general, people are more likely to exert effort when they have a stronger intention to carry out an activity. It has been demonstrated that purpose has a substantial impact on fruit and vegetable intake behavior (Godin *et al*., 2010; Blanchard *et al*., 2009). But behavior is not always the result of intention. A theoretical "gap" between intention and conduct is produced by this disparity (Sniehotta *et al*., 2015). Several researches that used the TPB to the consumption of fruits and vegetables have shown this discrepancy (Kothe *et al*., 2014; Mullan and Xavier, 2013). The term "self-regulation" has been defined as the intentional internal regulation of an individual in response to environmental triggers, with the aim of managing behavioral patterns (Gwyther *and* Holland, 2015). Research has identified the importance of self-regulation in various domains of health behaviors, including the consumption of fruits and vegetables (Mullan and Xavier, 2013).

The highest influence shaping consumption behavior and the intensity of fruit and vegetable consumption comes from the Perceived Behavior Control (PBC) variable. This indicates a shift in consumer behavior. In the Theory of Planned Behavior (TPB), it is explained that repeated intensity can shape behavior influenced by surrounding beliefs, such as those within the family. If a person grows up in a family environment where fruits and vegetables are consumed daily, the family norm is expected to increase fruit and vegetable

consumption. However, this study shows that the most significant factor shaping consumption behavior is the individual's belief in their ability to control the behavior around them, such as ease of access, time constraints, and self-confidence. The current shift in fruit and vegetable consumption shows diverse trends across various regions. In some urban areas, public awareness of the importance of consuming healthy foods, including fruits and vegetables, has increased. This is driven by health campaigns, healthy lifestyle trends, and easier access to fresh produce through modern markets or online services.

Individuals tend not to consider family consumption as much when consuming fruits and vegetables because social and economic changes in urban environments have led to a more individualistic lifestyle. They have greater control over their consumption decisions, including accessibility, time, and personal preferences. They focus more on the convenience of obtaining and preparing food that suits their needs. On the other hand, this shift in consumption patterns is also driven by the increasing availability of ready-to-eat healthy food services and e-commerce, which allow individuals to access fruits and vegetables without relying on family consumption patterns. Additionally, changes in family structures, such as the growing number of individuals living alone or away from their families due to work or education, further contribute to this trend. Papadaki *et al* (2007) also explain the unhealthy food choices and reduced fruit and vegetable consumption among Greek students living away from home.

Conclusions: Indonesia is a tropical country with abundant natural resources of fruits and vegetables. However, in reality, fruit and vegetable consumption behaviors in Indonesia are generally still below the Balanced Nutrition Guidelines. Why does this happen? This study is important to examine the role of the Theory of Planned Behavior in shaping fruit and vegetable consumption patterns in Indonesia. This theory is utilized because it comprehensively addresses aspects ranging from attitudes to intentions and behaviors. Out of 225 respondents interviewed, the most frequently consumed fruits with the highest average daily consumption are pears at 126.895 grams/day, pineapples at 119.305 grams/day, and papayas at 83.1 grams/day. For vegetables, the highest average daily consumption is carrots at 100.06 grams/day, tomatoes at 93.2 grams/day, and spinach at 79.16 grams/day. It is important to note that the respondents represent consumers with a minimum income level of IDR 2,038,005, indicating a relatively adequate level of well-being. Despite this, 98% of respondents reported limited time to prepare fruits and vegetables for family meals, showing a preference for ready-to-eat options. Additionally, the perception of fruits and vegetables remains superficial for many consumers, often associated more with cosmetic benefits—such as skin health—than with overall well-being.

The shift in consumer behavior can be identified through the analysis in this study. The theoretical implication explored in this study involves perceived behavioral control, which is identified as the most influential variable and could be further followed up in developing strategic policy recommendations. Consumers no longer rely on social support from those around them as the primary factor in shaping their fruit and vegetable consumption behavior. Instead, having sufficient control over their consumption has become the main factor, such as the availability of easily accessible fruits and vegetables, convenience and time efficiency in preparation, and their own ability to consume them. The shift in individual fruit and vegetable consumption behavior is driven by a more individualistic lifestyle, changes in family structure, and easy access to ready-to-eat food.

Given these findings, it is essential for the Indonesian government to develop targeted policy interventions that respond to these behavioral shifts such as increase access to ready-to-eat fruits and vegetables, encourage local entrepreneurs and SMEs to develop innovative, convenient fruit and vegetable-based products, launch public awareness campaigns that emphasize the broader health benefits of fruits and vegetables, and design health promotion initiatives that enhance perceived behavioral control, such as providing tools and tips for time-saving food preparation.

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