Factors changing consumer behavior in food supplements industry after Covid-19 pandemic

Wanwanut Kitja

International Business, International College, Rangsit University, Pathum Thani, Thailand
E-mail: wanwanut.k63@rsu.ac.th

Abstract

In this paper, the factors changing consumer behavior in food supplements industry after Covid-19 pandemic, a case study in Rangsit University, Pathum Thani, are studied by analyzing factors changing consumer behavior: depression, hopelessness, stress, and Covid-19 anxiety. Since Covid-19 pandemic has caused significant changes in consumer behavior across various industries, including the food supplements industry, this paper thus aims to understand the impact of the Covid-19 pandemic on consumer behavior in the food supplements industry and identify the factors driving these changes. The researcher also analyzed demographic and consumer behavior in food supplement industry to study factors that change consumer buying behavior by conducting survey research. The samples in this study are consumer who live around Rangsit University. The sampling method used to collect questionnaires in this work is convenience sampling.

The results of the study found that consumer had various effects on consumer behavior in food supplements industry, especially depression, Covid-19 anxiety, hopelessness, and stress, respectively. Demographically, income and age affected consumer behavior as consumer with different income and age have different impact of the Covid-19 pandemic on their purchasing behavior, while gender, and career had no effect.

***Keywords*:** *Consumer behavior, Food supplements industry, Factors changing consumer behavior*

1. Introduction

The COVID-19 pandemic has caused significant changes in consumer behavior across various industries, including the food supplements industry. As people become more health-conscious, the demand for food supplements has increased, leading to a surge in sales. The pandemic has also brought attention to the importance of maintaining a healthy immune system, which has further fueled the demand for food supplements.

Understanding consumer behavior in the food supplements industry is essential for businesses to adapt to these changes and stay competitive. The factors that influence consumer behavior in the food supplements industry have also changed due to the pandemic. Factors such as price, quality, brand loyalty, and convenience still play a significant role, but new factors have emerged, such as trust in the brand, product safety, and availability.

Therefore, it is important to conduct a study that explores the factors changing consumer behavior in the food supplements industry after the COVID-19 pandemic. The study can provide valuable insights into consumer behavior and help businesses develop effective marketing strategies to meet the evolving demands of consumers. Moreover, it can also help policymakers and regulators in the industry to better understand the changing needs and concerns of consumers and make informed decisions that benefit the public's health and safety.

The COVID-19 pandemic has significantly impacted consumer behavior in various industries, including the food supplements industry. As consumers become more health-conscious and seek ways to maintain their wellbeing, the demand for food supplements has increased. However, the pandemic has also caused changes in consumer behavior, such as increased online shopping and decreased brand loyalty. Therefore, there is a need to investigate the factors that influence consumer behavior in the food supplements industry after the pandemic and how these factors have changed. This research aims to identify these factors and provide insights that can help businesses adapt to changing market conditions and meet consumer demand, while also promoting healthy eating habits and improving public health.

The researcher aims to understand how the pandemic has specifically affected consumer behavior in this sector, such as changes in consumption patterns, preferences, and purchasing decisions. The researcher

wants to explore how depression, hopelessness, stress, and Covid-19 anxiety have changed consumer behavior in the food supplements industry.

2. Objectives

This chapter presents an overview of a review of related researche, it was found that the factors changing consumer behavior in food supplements industry are as follows:

2.1 Depression

Depression is a mental health disorder that is characterized by persistent feelings of sadness, hopelessness, and a lack of interest or pleasure in activities that one previously enjoyed. Depression has been identified as a significant factor affecting consumer behavior in the food supplements industry. With depression being a common mental health condition, many consumers are seeking out supplements that can help improve their mood and alleviate symptoms of depression. This has led to an increase in the demand for food supplements containing ingredients such as omega-3 fatty acids, vitamins B, and vitamin D, which have been shown to have potential mood-boosting effects. Additionally, the COVID-19 pandemic has resulted in increased levels of depression worldwide, leading to a surge in demand for food supplements that can help to alleviate symptoms. Several studies found that omega-3 fatty acids may have potential mood- boosting effects and can help alleviate symptoms of depression: Diet and Depression: Exploring the Biological Mechanisms of Action and vitamins B and vitamin D may have a role in regulating mood and reducing symptoms of depression.

2.2 Hopelessness

Hopelessness is a feeling of despair, discouragement, and lack of belief in one's ability to change or improve a situation. Hopelessness is key variable that is affecting consumer behavior in the food supplements industry. With many consumers feeling a sense of despair about the future due to the COVID-19 pandemic, there has been an increase in demand for supplements that can help to improve mental health and wellbeing. This has led to an increase in demand for supplements containing adaptogens such as ashwagandha and rhodiola, which have been shown to have potential stress-reducing and mood-boosting effects.

A study by Seo et al. (n.d.) found that adaptogens such as ashwagandha and rhodiola have potential stress-reducing effects and may help alleviate symptoms of hopelessness.
In their study "Effects of Rhodiola rosea Supplementation on Mental Performance, Cortisol Response, and Fatigue in Healthy Individuals," Hung et al. (2011) found that rhodiola may improve mental performance and reduce fatigue.

2.3 Stress

Stress can be defined as a natural and normal response to a perceived threat or demand on the body or mind. It involves the release of hormones and can have physical and psychological effects. Stress is a significant factor affecting consumer behavior in the food supplements industry, with many consumers seeking out supplements that can help to alleviate stress and promote relaxation. With the COVID-19 pandemic causing increased levels of stress worldwide, there has been a surge in demand for supplements containing ingredients such as magnesium, L- theanine, and GABA, which have been shown to have potential stress-reducing effects.

A study by ScienceDirect. (2018) found that magnesium supplementation may have potential stress-reducing effects and may help alleviate symptoms of stress.
In their study "The Effects of L-Theanine on Alpha-Band Oscillatory Brain Activity During a Visuo-Spatial Attention Task," Gomez et al. (2008) found that L- theanine may improve attentional performance and reduce stress-related physiological responses.

2.4 Covid-19 anxiety

Covid-19 anxiety refers to the emotional distress and anxiety caused by the pandemic. It can cause physical and mental health symptoms. COVID-19 anxiety has been identified as a significant factor affecting consumer behavior in the food supplements industry, with many consumers seeking out supplements that can help to support their immune system and overall health. This has led to an increase in demand for supplements containing ingredients such as vitamin C, zinc, and elderberry, which have been shown to have potential immune-boosting effects. Additionally, many consumers are seeking out supplements that can help to reduce anxiety and promote relaxation, leading to increased demand for adaptogens and stress-reducing supplements.

In their study "COVID-19 Anxiety and Coping Strategies Among Nurses During the COVID-19 Pandemic," Ay et al. (2023) found that many healthcare workers experienced high levels of COVID-19 anxiety and that coping strategies such as social support and self- care may be effective in reducing anxiety. A study by Hemila & Chalker (2019) found that vitamin C supplementation may have potential immune-boosting effects and may reduce the incidence and severity of respiratory infections such as COVID-19. To fulfil the research question: How do depression, hopelessness, stress, and Covid-19 anxiety affect consumer behavior in food supplements industry? following is the conceptual framework.

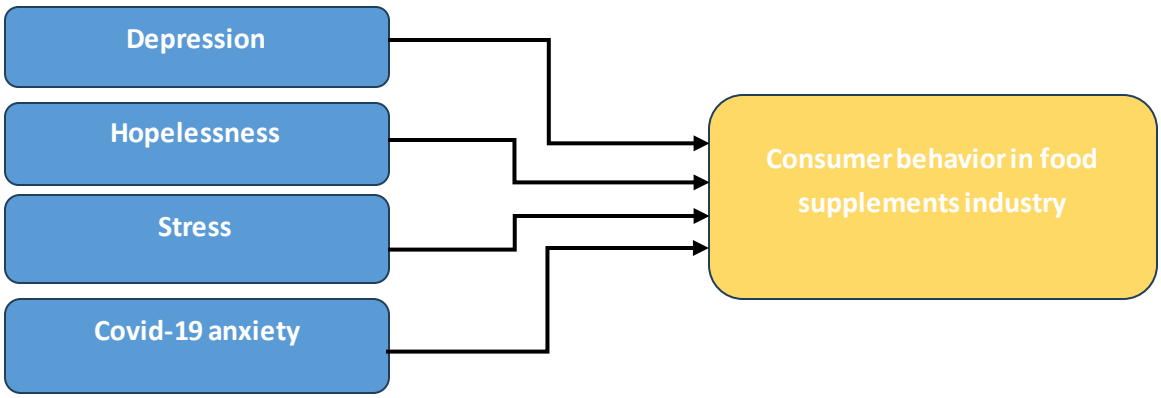

Figure 1: Conceptual Framework

List of Hypotheses

Test of relationship

Hypothesis 1:

Depression, hopelessness, stress, Covid-19 anxiety affect consumer behavior in food supplements industry.

Test of the level of the constructs

Hypothesis 2:

Depression, hopelessness, stress, Covid-19 anxiety are high.

Test of difference between 2 groups

Hypothesis 3:

Consumer who have and have not got infected from Covid-19 pandemic have different level of stress.

Hypothesis 4:

Male and female have different level of hopelessness.

Hypothesis 5:

Consumer who are company employee and student have different Covid-19 anxiety.

Hypothesis 6:

Consumer who are age less than 21 years old and more than 21 years old have different stress.

Hypothesis 7:

Consumer who have ever got and have never got infected from Covid-19 pandemic have different Covid-19 anxiety.

Test of difference among many groups

Hypothesis 8:
Consumer with different salary base have different depression.
Hypothesis 9:
Consumer who live in different accommodation have different hopelessness.

3. Materials and Methods

In this section the research methodology used in the study is described. The Geographical area where the study was conducted, the study design and the population and sample are described. The instrument used to collect the data, including methods implemented to maintain validity and reliability of the instrument, are described.

3.1 Research Design

The quantitative study will use an online survey to collect data from a larger sample of consumers in the food supplements industry. A stratified random sampling technique will be used to select participants from different regions and age groups. The survey questionnaire will be designed to measure the factors identified in the qualitative study, including attitudes towards food supplements, motivations for purchasing food supplements, preferences for different types of food supplements, and the impact of the COVID-19 pandemic on their purchasing behavior. The survey will also collect demographic information, such as age, gender, income, and accommodation.

3.2 Population, Sampling Technique, and Sample size

3.2.1 Population

According to Burns and Grove (1993:779), a population is defined as all elements (individuals, objects and events) that meet the sample criteria for inclusion in a study. The study population consisted of all people that live around Rangsit University.

3.2.2 Sampling Technique

Sampling technique, also known as sampling method, it is a methods used to select a subset of individuals from a larger population. Common techniques include simple random sampling, stratified sampling, cluster sampling, systematic sampling, convenience sampling, snowball sampling, and purposive sampling.

The samples used in this research were consumers who live around Rangsit University by using convenience sampling as a method. Convenience sampling is a method that the researcher uses any subjects that are available to participate in the research study. This involves selecting individuals who are readily available or easy to access, such as volunteers or people who happen to be in a certain location.

3.2.3 Sample size

As the researcher uses any subjects that are available to participate in the research study which known as convenience sampling, the researcher is thus wished to have a 95 percent confident level (Z) and a range of error (E) of less than 10% with estimated proportion of success (p) = 0.5, and estimated proportion of failure (q) = 0.5. Therefore, sampling size can be calculated as follows:

n = $Z2p\ q\ E2$

where
n = number of items in sample
$Z2$ = square of the confidence level in standard error units
p = estimated proportion of successes
q = 1 – q, or estimated proportion of failures
$E2$ = square of the maximum allowance for error between the true proportion and the sample proportion
n = 1.962(0.5)(0.5) 2 0.1
n = (3.8416)(0.25) 0.1
n = 96.04

According to the calculation, sampling size is equal to 96.04, however the researcher round up to 100 to prevent mistakes from answering the questionnaire incorrectly.

3.3 Questionnaire

The questionnaire was based on other research instruments used in similar studies. The researcher compiled the questionnaire from a study of factors influencing on purchase decision of a dietary supplement product for generation X in Bangkok during Covid-19 by Miss Suchaya Jittangboonya, a student from College of Management, Mahidol University and the study of consumer decision making behavior in dietary supplement consumption in Donmueang district, Bangkok by Mr. Akarapon Sawetkamon, a student from Department of Organization Administration in the Faculty of Liberal Arts, Krirk University. The researcher also compiled the questionnaire from online questionnaire on the internet. From the website of Deprese Euzona, Patient, Mind Garden, and Phenxtoolkit. The researcher of this study complied and adjusted the questionnaire with the researcher's supervisor.

Based on the previous research from the literature review, the researcher used in this study are discussed as follows:

Part 1: General questions about consumer behavior in food supplement industry
Part 2: Factors influencing consumer buying behavior in food supplement
Part 3: Demographic

3.4 Data Analysis Plan

A data analysis strategy is a road map for organizing and analysing the survey data, and it should assist you in achieving three goals that are connected to the survey's original goal: Respond to your main research inquiries. To comprehend those responses, ask survey participants additional precise questions. Quantitative date analysis was obtained from primary data discussed above in 3.1 research design. This data analysis was based on their answering on google form, and data typing using Excel, and SAS Enterprise Guide which focus on numerical/quantitative data analysis. Perform a hypothesis test, researchers obtain a random sample from the population and perform a hypothesis test on the respondents a null and alternative hypothesis, at the p-value of less than .05 to reject null hypothesis and confident level of 95%.

Table 1: Data Analysis Plan

No	Hypothesis	Statistical Design
H1	Depression, hopelessness, stress, Covid-19 anxiety affect consumer behavior in food supplements industry.	Multiple Regression Analysis
H2	Depression, hopelessness, stress, Covid-19 anxiety are high.	One simple t-test
H3	Consumer who have and have not got infected from Covid-19 pandemic have different level of stress.	Independent sample t-test
H4	Male and female have different level of hopelessness.	Independent sample t-test
H5	Consumer who are company employee and student have different Covid-19 anxiety.	Independent sample t-test
H6	Consumer who are age less than 21 years old and more than 21 years old have different stress.	Independent sample t-test
H7	Consumer who have ever got and have never got infected from Covid-19 pandemic have different Covid-19 anxiety.	Independent sample t-test
H8	Consumer with different salary base have different depression.	One way ANOVA
H9	Consumer who live in different accommodation have different hopelessness.	One way ANOVA

4. Results and Discussion

This chapter discusses the data analysis and findings of the study. The questionnaire used in this retrospective study was carefully analyzed to ensure that the data gathered was presented clearly with the aid of tables, percentages and graphs, where possible. A retrospective chart analysis was conducted to capture the data essential to accomplish the research objectives.

4.1 Sample Profiles

In this section, the gender distribution, age distribution, career, income, and accommodation of the research population is discussed.

Table 2: Gender

Row Labels	Count of Gender	Count of Gender2
Female	66	65.35%
Male	35	34.65%
Grand Total	**101**	**100.00%**

People who are female have 65.35% and people who are male have 34.65%.

Table 3: Age

Row Labels	Count of Age	Count of Age2
Less than 21 years	29	28.71%
More than 21 years	72	71.29%
Grand Total	**101**	**100.00%**

People that age less than 21 years old have 28.71% and people that age more than 21 years old have 71.29%.

Table 4: Career

Row Labels	Count of Career	Count of Career2
Company employee	14	13.86%
Student	87	86.14%
Grand Total	**101**	**100.00%**

People who are company employee have 13.86% and people who are student have 86.14%.

Table 5: Income

Row Labels	Count of Income	Count of Income2
10,000 Baht or less	53	52.48%
10,001 - 20,000Baht	30	29.70%
More than 20,000 Baht	18	17.82%
Grand Total	**101**	**100.00%**

People who have income 10,000 Baht or less have 52.48%. People who have income 10,001 – 20,000 Baht have 29.70%. And people who have income more than 20,000 Baht have 17.82%.

Table 6: Accommodation

Row Labels	Count of Accommodation	Count of Accommodation2
Apartment	34	33.66%
Condominium	17	16.83%
Dormitory	24	23.76%
House	26	25.74%
Grand Total	**101**	**100.00%**

People who live in apartment have 33.66%. People who live in condominium have 16.83%. People who live in dormitory have 23.76%. And people who live in house have 25.74%.

4.2 Descriptive Information

In this section, it is show the descriptive information of general question about consumer behavior in food supplements industry.

Table 7: Count of Have you ever got infected from Covid-19 pandemic

Row Labels	Count of Have you ever got infected from Covid-19 pandemic?	Count of Have you ever got infected from Covid-19 pandemic?2
No	34	33.66%
Yes	67	66.34%
Grand Total	**101**	**100.00%**

People who have not got infected have 33.66% and people who have got infected have 66.34%.

4.3 Hypotheses Testing

4.3.1 Hypothesis 1: Depression, hopelessness, stress, Covid-19 anxiety affect consumer behavior in food supplements industry.

Table 8: Consumer buying behavior

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	9.27537	2.31884	2.54	0.0445
Error	96	87.54022	0.91188		
Corrected Total	100	96.81559			

Root MSE	0.95492	R-Square	0.0958
Dependent Mean	3.63614	Adj R-Sq	0.0581
Coeff Var	26.26200		

Parameter Estimates						
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
Intercept	1	3.12439	0.42214	7.40	<.0001	0
Depression	1	0.35535	0.16170	2.20	0.0304	0.30132
Hopelessness	1	-0.00042516	0.14737	-0.00	0.9977	-0.00043242
Covid-19 anxiety	1	-0.25510	0.13293	-1.92	0.0580	-0.19689
Stress	1	0.00653	0.18928	0.03	0.9726	0.00484

F value is 2.54, with p-value lower than 0.05. Null hypothesis can be rejected, at least one of the independent variable has significant effect on customer buying behavior. % of consumers buying behavior is explained by depression, hopelessness, covid-19 anxiety, and stress. From parameter estimates, p-values of the t-scores of depression, hopelessness, covid-19 anxiety, and stress are less than 0.05 so they significantly affect consumer buying behavior. From the standardized estimate, depression provides the highest impact on consumer buying behavior. Therefore, H1 is supported by the data.

4.3.2 Hypothesis 2: Depression, hopelessness, stress, Covid-19 anxiety are high.

Table 9: Depression

The TTEST Procedure, Variable: Depression

N	Mean	Std Dev	Std Err	Minimum	Maximum
101	2.5525	0.8343	0.0830	1.0000	5.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
2.5525	2.3878	2.7172	0.8343	0.7330	0.9684

DF	t Value	Pr > |t|
100	-5.39	<.0001

T-value of depression is -5.39, with p-value of less than 0.05, Null hypothesis can be rejected. The level of depression is significantly different from 3. Mean of depression is 2.5525. It can be concluded that depression is high.

Variable: Hopelessness

N	Mean	Std Dev	Std Err	Minimum	Maximum
101	2.7248	1.0007	0.0996	1.0000	5.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
2.7248	2.5272	2.9223	1.0007	0.8792	1.1616

DF	t Value	Pr > |t|
100	-2.76	0.0068

T-value of hopelessness is -2.76, with p-value of less than 0.05, Null hypothesis can be rejected. The level of hopelessness is significantly different from 3. Mean of hopelessness is 2.7248. It can be concluded that depression is high.

Variable: Stress

N	Mean	Std Dev	Std Err	Minimum	Maximum
101	3.1050	0.8412	0.0837	1.0000	5.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
3.1050	2.9389	3.2710	0.8412	0.7391	0.9765

DF	t Value	Pr > |t|
100	1.25	0.2128

T-value of stress is 1.25, with p-value of more than 0.05, Null hypothesis can not be rejected. The level of depression is no different from 3. Mean of stress is 3.1050. It can be concluded that stress is low.

Variable: Covid-19 anxiety

N	Mean	Std Dev	Std Err	Minimum	Maximum
101	1.6218	0.7594	0.0756	1.0000	4.4000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
1.6218	1.4719	1.7717	0.7594	0.6672	0.8815

DF	t Value	Pr > |t|
100	-18.24	<.0001

T-value of covid-19 anxiety is -18.24, with p-value of less than 0.05, Null hypothesis can be rejected. The level of covid-19 anxiety is significantly different from 3. Mean of covid-19 anxiety is 1.6218. It can be concluded that covid-19 anxiety is high.

4.3.3 Hypothesis 3: Consumer who have and have not got infected from Covid-19 pandemic have different level of stress.

Table 10: Stress

The TTEST Procedure

Variable: Stress

Have you ever got infected from	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
No		34	3.1471	0.9070	0.1555	1.0000	5.0000
Yes		67	3.0836	0.8121	0.0992	1.4000	5.0000
Diff (1-2)	Pooled		0.0635	0.8449	0.1779		
Diff (1-2)	Satterthwaite		0.0635		0.1845		

Have you ever got infected from	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
No		3.1471	2.8306	3.4635	0.9070	0.7315	1.1938
Yes		3.0836	2.8855	3.2817	0.8121	0.6941	0.9789
Diff (1-2)	Pooled	0.0635	-0.2895	0.4165	0.8449	0.7419	0.9815
Diff (1-2)	Satterthwaite	0.0635	-0.3055	0.4325			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	99	0.36	0.7220
Satterthwaite	Unequal	60.326	0.34	0.7320

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	33	66	1.25	0.4410

F-value is 1.25 and its p-value is more than 0.05 so there is no difference in variances. So equal variance are assumed.

T-value is 0.36, with p-value more than 0.05. Null hypothesis can not be rejected. The means of stress between two groups are no different. No and yes have the same level of stress.

4.3.4 Hypothesis 4: Male and female have different level of hopelessness.

Table 11: Hopelessness

The TTEST Procedure
Variable: Hopelessness

Gender	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Female		66	2.7424	1.0423	0.1283	1.0000	5.0000
Male		35	2.6914	0.9310	0.1574	1.0000	4.8000
Diff (1-2)	Pooled		0.0510	1.0055	0.2102		
Diff (1-2)	Satterthwaite		0.0510		0.2030		

Gender	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
Female		2.7424	2.4862	2.9987	1.0423	0.8899	1.2583
Male		2.6914	2.3716	3.0112	0.9310	0.7530	1.2197
Diff (1-2)	Pooled	0.0510	-0.3662	0.4682	1.0055	0.8828	1.1680
Diff (1-2)	Satterthwaite	0.0510	-0.3533	0.4553			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	99	0.24	0.8089
Satterthwaite	Unequal	76.538	0.25	0.8024

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	65	34	1.25	0.4775

F-value is 1.25 and its p-value is more than 0.05 so there is no difference in variances. So equal variance is assumed. T-value is 0.24, with p-value more than 0.05. Null hypothesis can not be rejected. The means of hopelessness between two groups are no different. Male and female have the same level of hopelessness.

4.3.5 Hypothesis 5: Consumer who are company employee and student have different Covid-19 anxiety.

Table 12: Covid-19 anxiety

The TTEST Procedure
Variable: Covid-19 anxiety

Career	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Company employee		14	1.5714	0.6120	0.1636	1.0000	3.0000
Student		87	1.6299	0.7833	0.0840	1.0000	4.4000
Diff (1-2)	Pooled		-0.0585	0.7630	0.2197		
Diff (1-2)	Satterthwaite		-0.0585		0.1839		

Career	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
Company employee		1.5714	1.2181	1.9248	0.6120	0.4436	0.9859
Student		1.6299	1.4629	1.7968	0.7833	0.6817	0.9207
Diff (1-2)	Pooled	-0.0585	-0.4944	0.3775	0.7630	0.6699	0.8863
Diff (1-2)	Satterthwaite	-0.0585	-0.4413	0.3244			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	99	-0.27	0.7907
Satterthwaite	Unequal	20.542	-0.32	0.7537

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	86	13	1.64	0.3214

F-value is 1.64 and its p-value is more than 0.05 so there is no difference in variances. So equal variance is assumed. T-value is -0.270, with p-value more than 0.05. Null hypothesis can not be rejected. The means of covid-19 anxiety between two groups are no different. Company employee and student have the same level of covid-19 anxiety.

4.3.6 Hypothesis 6: Consumer who are age less than 21 years old and more than 21 years old have different stress.

Table 13: Stress

The TTEST Procedure
Variable: Stress

Age	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Less than 21 years old		29	3.2414	0.7471	0.1387	2.0000	5.0000
More than 21 years old		72	2.9056	0.7057	0.0832	1.4000	4.2000
Diff (1-2)	Pooled		0.3358	0.7177	0.1578		
Diff (1-2)	Satterthwaite		0.3358		0.1618		

Age	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
Less than 21 years old		3.2414	2.9572	3.5256	0.7471	0.5929	1.0105
More than 21 years old		2.9056	2.7397	3.0714	0.7057	0.6063	0.8444
Diff (1-2)	Pooled	0.3358	0.0226	0.6490	0.7177	0.6301	0.8337
Diff (1-2)	Satterthwaite	0.3358	0.0108	0.6609			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	99	2.13	0.0359
Satterthwaite	Unequal	49.23	2.08	0.0431

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	28	71	1.12	0.6829

F-value is 1.12 and its p-value is more than 0.05 so there is no difference in variances. So equal variance are assumed. T-value is 2.13, with p-value less than 0.05. Null hypothesis can be rejected. The means of stress between two groups are significantly different. People who are age less than 21 years old and people who are age more than 21 years old have the different level of stress.

4.3.7 Hypothesis 7: Consumer who have ever got and have never got infected from Covid-19 pandemic have different Covid-19 anxiety.

Table 14: Covid-19 anxiety

The TTEST Procedure
Variable: Covid-19 anxiety

Have you ever got infected from	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
No		34	1.4294	0.5829	0.1000	1.0000	3.0000
Yes		67	1.7194	0.8217	0.1004	1.0000	4.4000
Diff (1-2)	Pooled		-0.2900	0.7506	0.1580		
Diff (1-2)	Satterthwaite		-0.2900		0.1417		

Have you ever got infected from	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
No		1.4294	1.2260	1.6328	0.5829	0.4701	0.7672
Yes		1.7194	1.5190	1.9198	0.8217	0.7023	0.9904

Have you ever got infected from	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
Diff (1-2)	Pooled	-0.2900	-0.6036	0.0236	0.7506	0.6590	0.8719
Diff (1-2)	Satterthwaite	-0.2900	-0.5715	-0.00847			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	99	-1.83	0.0695
Satterthwaite	Unequal	88.252	-2.05	0.0436

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	66	33	1.99	0.0329

F-value is 1.99 and its p-value is less than 0.05 so the variances are unequal.

T-value is -2.05, with p-value less than 0.05. Null hypothesis can be rejected. The means of covid-19 anxiety between two groups are significantly different. No and yes have the different level of covid-19 anxiety.

4.3.8 Hypothesis 8: Consumer with different salary base have different depression.

Table 15: Income

One-Way Analysis of Variance

Results

The ANOVA Procedure

Class Level Information		
Class	Levels	Values
Income	3	10,000 Baht or less 10,001 - 20,000 Baht More than 20,000 Baht

The ANOVA Procedure
Dependent Variable: Depression

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	3.64675750	1.82337875	2.71	0.0716
Error	98	65.96512369	0.67311351		
Corrected Total	100	69.61188119			

R-Square	Coeff Var	Root MSE	Depression Mean
0.052387	32.14272	0.820435	2.552475

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Income	2	3.64675750	1.82337875	2.71	0.0716

F-value is 2.71, with p-value more than 0.05. Null hypothesis can not be rejected. There is no group is different from other. Salary are categorized into 3 groups, which are 10,000 Baht or less, 10,001 – 20,000 Baht, and more than 20,000 Baht.

4.3.9 Hypothesis 9: Consumer who live in different accommodation have different hopelessness.

Table 16: Accommodation

Class Level Information		
Class	Levels	Values
Accommodation	4	Apartment Condominium Dormitory House

The ANOVA Procedure
Dependent Variable: Hopelessness

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	8.6275230	2.8758410	3.05	0.0323
Error	97	91.5205958	0.9435113		
Corrected Total	100	100.1481188			

R-Square	Coeff Var	Root MSE	Hopelessness Mean
0.086148	35.64893	0.971345	2.724752

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Accommodation	3	8.62752304	2.87584101	3.05	0.0323

The ANOVA Procedure
Duncan's Multiple Range Test for Hopelessness

Alpha	0.05
Error Degrees of Freedom	97
Error Mean Square	0.943511
Harmonic Mean of Cell Sizes	23.75812

Number of Means	2	3	4
Critical Range	.5593	.5886	.6081

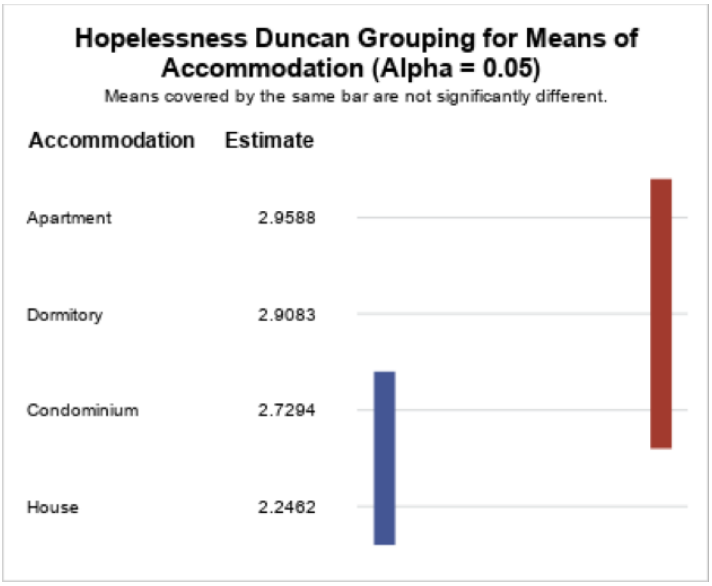

Figure 2: Accommodation list

F-value is 3.05, with p-value less than 0.05. Null hypothesis can be rejected. At least one group is different from other. Accommodation are categorized into 4 groups, which are apartment, condominium, dormitory, and house.

5. Conclusion

In this chapter the conclusion derived from the findings of study on the influence factor of consumer behavior after covid-19 pandemic. The conclusions were based on the purpose, research question and results of the study.

The results of the study found that consumer had various effects on consumer behavior in food supplements industry, especially depression, Covid-19 anxiety, hopelessness, and stress, respectively. There are the influencing factors of food supplements industry behavior to change. Depression has the most influencing effect on consumer behavior in food supplements industry. This show that the effect of covid-19 pandemic has created international anxiety about food supplements industry. Demographically, income and age affected consumer behavior as consumer with different income and age have different impact of the Covid-19 pandemic on their purchasing behavior, while gender, and career had no effect.

The COVID-19 pandemic has significantly impacted consumer behavior in various industries, including the food supplements industry. As consumers become more health-conscious and seek ways to maintain their wellbeing, the demand for food supplements has increased. However, the pandemic has also caused changes in consumer behavior, such as increased online shopping and decreased brand loyalty. Therefore, there is a need to investigate the factors that influence consumer behavior in the food supplements industry after the pandemic and how these factors have changed. This research aims to identify these factors and provide insights that can help businesses adapt to changing market conditions and meet consumer demand, while also promoting healthy eating habits and improving public health.

Hypotheses testing results

This point describes the results of hypothesis testing from previous chapter. Which is the result of influence factor of consumer behavior after covid-19 pandemic.

Table 17: Hypotheses Testing Results

No	Hypothesis	Statistic Used	Results
H1	Depression, hopelessness, stress, Covid-19 anxiety affect consumers behavior in food supplements industry.	Multiple Regression Analysis	Reject
H2	Depression, hopelessness, stress, Covid-19 anxiety are high.	One simple t-test	Reject
H3	Consumer who have and have not got infected from Covid-19 pandemic have different level of stress.	Independent sample t-test	Not reject
H4	Male and female have different level of hopelessness.	Independent sample t-test	Not reject
H5	Consumer who are company employee and student have different Covid-19 anxiety.	Independent sample t-test	Not reject
H6	Consumer who are age less than 21 years old and more than 21 years old have different stress.	Independent sample t-test	Reject

No	Hypothesis	Statistic Used	Results
H7	Consumer who have ever got and have never got infected from Covid-19 pandemic have different Covid-19 anxiety.	Independent sample t-test	Reject
H8	Consumer with different salary base have different depression.	One way ANOVA	Not reject
H9	Consumer who live in different accommodation have different hopelessness.	One way ANOVA	Reject

6. Acknowledgements

I would like to express my gratitude to Principal Mr. Teeradej Puapradit, a lecturer of Business Research Methodology from International College, Rangsit University for his guidance, academic encouragement, and friendly critique. His attitude and care have helped me to complete this research project on time. I am grateful to the college administration for providing me with such a significant chance.

References

Ay, E., Turkoglu, N. & Kavuran, E. (2023). *Anxiety and Coping Strategies among Nursing Students During the Covid-19 Pandemic: An Example from Turkey*, 1-10. Retrieved March 30, 2023, from http://www.internationaljournalofcaringsciences.org/docs/19.%20eda%20.pdf

Euzona,D. (n.d.). *Beck depression inventory (BDI-II) free test online*. Retrieved March 21, 2023, from https://deprese.euzona.cz/en-index.php

Gomez, M., Kelly, S., Montesi, J. & Foxe, J. (2008). *The Effects of L-theanine on Alpha-Band Oscillatory Brain Activity During a Visuo-Spatial Attention Task*. Retrieved March 30, 2023, from https://www.researchgate.net/publication/247392900_The_Effects_of_L-theanine_on_Alpha-Band_Oscillatory_Brain_Activity_During_a_Visuo-Spatial_Attention_Task

Hemila, H. & Chalker, E. (2019). *Vitamin C Can Shorten the Length of Stay in the ICU: A Meta-Analysis,* 1-18. Retrieved April 2, 2023, from https://www.researchgate.net/publication/332075264_Vitamin_C_Can_Shorten_the_Length_of_Stay_in_the_ICU_A_Meta-Analysis

Hung, SK., Perry, R. & Ernst, E. (2011). *The effectiveness and efficacy of Rhodiola rosea : A systematic review of randomized clinical trials.* Retrieved March 28, 2023, from https://www.ncbi.nlm.nih.gov/books/NBK80766/

Garden, M. (1994). *Perceived stress scale*. Retrieved March 22, 2023, from https://www.mindgarden.com/documents/PerceivedStressScale.pdf

Jittangboonya, S. (2021). *Factors influencing on purchase decision of a dietary supplement product for generation X in Bangkok during Covid-19, 9-33.* Retrieved April 3, 2023, from https://archive.cm.mahidol.ac.th/bitstream/123456789/4363/1/TP%20GM.015%202021.pdf

Patient. (n.d.). *Medical calculators patient health questionnaire (PHQ-9)*. Retrieved March 21, 2023, from https://patient.info/doctor/patient-health-questionnaire-phq-9

PubMed Advanced. (2021). *Diet and depression: exploring the biological mechanisms of action*. Retrieved March 26, 2023, from https://pubmed.ncbi.nlm.nih.gov/33144709/

Phenxtoolkit. (n.d.). *Coronavirus anxiety scale CAS. Retrieved March 22, 2023*, from https://www.phenxtoolkit.org/toolkit_content/PDF/Coronavirus_Anxiety_Scale_CAS.pdf

Sawetkamon, A. (2021). *Consumer decision making in dietary supplement consumption in Donmueang district, Bangkok*, 15-110. Retrieved April 3, 2023, from https://mis.krirk.ac.th/librarytext/MOA/2564/F_Akarapon_Sawetkamon.pdf

ScienceDirect. (2018). *Effects of zinc, magnesium, and chromium supplementation on cardiometabolic risk in adults with metabolic syndrome: A double-blind, placebo-controlled randomised trial.* Retrieved March 29, 2023, from https://www.sciencedirect.com/science/article/abs/pii/S0946672X18300695

ScienceDirect. (2020). *Omega-3 fatty-acids modulate symptoms of depressive disorder, serum levels of omega-3 fatty acids and omega-6/omega-3 ratio in children. A randomized, double-blind and controlled trial.* Retrieved March 25, 2023, from https://www.sciencedirect.com/science/article/abs/pii/S0165178119325582

Seo, E., Klauck, S., Efferth, T. & Panossian, A. (n.d.). *Adaptogens in chemobrain (Part III): Antitoxic effects of plant extracts towards cancer chemotherapy-induced toxicity - transcriptome-wide microarray analysis of neuroglia cells.* Retrieved March 27, 2023, from https://pubag.nal.usda.gov/catalog/6229866