

COVID-19, Consumer Behavior and Inventory Management: A Study on the Retail Pharmaceutical Industry of Bangladesh

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Abstract

Purpose- This paper proposes a thorough investigation of the impact of the COVID-19 Pandemic on the consumer behavior and the inventory management of the retail pharmaceutical stores in Bangladesh. This study aims to explore the factors arising from an uncertainty like coronavirus pandemic on the inventory management of retail drug stores across the country.

Methodology- 208 pharmaceutical stores staff were surveyed using a 31-items structured questionnaire. As most of the respondents were not well educated the questions were delivered to them in the native language. Exploratory Factor Analysis, Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM) techniques were used to identify the significant factors.

Findings- Results demonstrated that five factors namely, improved inventory management, market syndicate & price hike, easier online purchase, delayed delivery, and supply shortage were found significantly responsible for the inventory management disruptions in the retail drug stores of Bangladesh.

Practical Implications- The identification of the factors impacting supply chain disruptions in the health and pharma industry may guide policymakers and pharma manufacturers to undertake necessary actions to overcome the accompanying challenges of the coronavirus pandemic.

Originality- This study is the first attempt to assess the relationship between a pandemic like COVID-19 and the inventory management disruptions in the retail pharma industry in Bangladesh.

Keywords: COVID-19, Retail Pharmaceutical Industry, Supply Chain Disruptions, Uncertainty.

1. Introduction

In December 2019, an outbreak of COVID-19 caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was initiated in the Wuhan, Hubei Province of China. (Han et al., 2020). Since then, this coronavirus pandemic has been continuing to impact human lives all over the world. As of August 31, 2020, there were 25,447,270 confirmed cases worldwide (851,512 deaths) resulting in border terminations, quarantines, and entirely shutting down of many crucial facilities, markets, and activities in the supply chains fully (Araz et al.2020). There was seen uncommon behavior by the retail consumer, such as hoarding of food and toilet paper, which was reported all over the world during March 2020 when the COVID-19 virus intensified into a pandemic (Miri et al., 2020; Wang et al.,2020). The sudden outbreak of the pandemic hardly hit the healthcare and pharmaceutical sectors of the countries while the unusual consumer behavior intensified the crisis in the beginning stage.

Health facilities are under great strain in response to the COVID-19 pandemic. The prompt supply of preventive and recovery medicines and the availability of event-driven pharmaceutical services are crucial to sustain and strengthen public health emergency activities during the coronavirus pandemic. (Liu et al., 2020). Bangladesh, a lower middle -income nation, and one of the most heavily populated parts of the world, is struggling to tackle the spread of this deadly disease. (Anwar, Nasrullah & Hosen, 2020). The country has also witnessed an unprecedented consumer behavior since the beginning of the pandemic followed by a supply chain disruption in several industries. The pharmaceutical supply chain was strongly affected by COVID-19 along with the overall healthcare system. The retail pharmacy stores faced a massive change in customer buying patterns. People started hoarding face masks, gloves, sanitizers, PPE, and other protective gear which affected the nationwide supplies. Additionally, visits to the retail drug stores declined heavily as people became more concerned about the health and maintained lock-down. Online purchase of emergency and regular medicines increased largely which brought about changes in the inventory management of retail pharmacies.

The pandemic has influenced temporal and spatial consumption displacement, based on patterns in consumer buying patterns. However, the existing literature has mostly focused on the changes

in consumer behavior for several areas of consumption. (Hall et al., 2020; Baker et al, 2020; Sheth 2020). But very few studies have concentrated on the shift of consumer behavior in the medical and pharmaceutical purchases. A high quality of medical supply service and efficient inventory management are important priorities for all health-care sectors. (Uthayakumar & Priyan, 2013). Furthermore, despite the critical role of uncertainty and consumer behavior in inventory management, these problems have been neglected in the pharmaceutical SCM literature. Additionally, no research has been conducted to test the mediation effect of consumer behavior in the relationship between COVID-19 and inventory management of retail drug stores from the perspective of Bangladesh. Hence, this study addresses these research gaps by investigating the impact of COVID-19 on consumer behavior and inventory management in the retail pharmaceutical industry of Bangladesh.

The broad objective of this paper is to investigate the relationship between COVID-19, consumer behavior, and inventory management in the retail pharma sector of Bangladesh. The specific objectives include illustrating the current scenario of COVID-19 and the pharmaceutical industry of Bangladesh, investigating the role of COVID-19 in consumer behavior changes, to analyze the mediation of consumer behavior in the relationship between the pandemic and inventory management of retail pharmacies in Bangladesh.

2. Literature Review

2.1 Theoretical Foundation

Uncertainty in SCM implies unpredictable demands that can allow a commodity demand to increase or decline. But whatever it is, we need effective inventory management to tackle uncertainty in demands. Since inventory expense covers a substantial portion of the cost of the finished products, one must efficiently maintain one's inventory so that the saved money can be utilized to incorporate some additional features as per consumer demands. Inventory management is nothing but managing any product owned by the organization, that could be a tangible commodity or a service to be used for. (Ahmed and Sultana, 2014).

(Dave and Patel, 1981) derived an EOQ model which was refurbished later (Nasrabadi and Mirzazadeh, 2016). And after many changes, this model is now largely applied to manage inventory. (Kamal and Sculfort, 2007) To find how much we should order we find out the value of Q following the formula given below,

$$Q = \sqrt{2DS}/HC \dots\dots\dots (1)$$

As uncertainty is the main concern of controlling the inventory so the method to obtain the actual data of the product is almost often difficult. Inventory control of different types of goods kept in a company's retail stores is not of equal value in terms of capital spent, revenue perspective, the volume of transactions, or lack of availability. (Godwin and Onwurah, 2013). Consequently, the realistic solution remains to apply regulatory determinations based on virtual importance to various inventory items as identified by the ABC analysis: an "inventory categorization framework consisting of dividing items into 3 categories: A, B, and C; A being the most valuable items, C being the least valuable." (Martin and Stanford, 2007; Angel et al., 2014).

2.2 Empirical Review

Covid-19 is increasing health risks which is forcing people to stay at home in isolation. For this reason, online shopping is gaining more attention for retail purchases. (Stanciu et al., 2020). Consequently, it is noticeable that the spending pattern of consumers has changed since the beginning of this pandemic. In early March 2020, consumer's spending patterns increased for about 20% regarding essentials e.g. groceries, discount stores, and pharmacies. (Cox et al., 2020). The effect of drug shortages at global levels varied by the level of medication supply, retail, and hospital only and types. The sales and usage of medicines that were yet under experiment and not fully approved by the FDA, like- hydroxychloroquine, favipiravir, lopinavir+ritonavir etc. increased unexpectedly due to the panic buying of customers.

The sudden outbreak of the COVID-19 pandemic has disrupted supply chain management in the retail pharmaceutical industry mediated by changes in consumer behavior and spending patterns along with the production facility and supply shortage. Speaking of SCM and inventory management during a pandemic, (Sin et al., 2020) suggests that wholesale contributors must be contacted often by supply chain managers to determine how much products are available, how the product will be allocated, and the status of incoming shipments. The procurement team must track down inventory levels daily and consider making personalized availability reports as well as placing emergency delivery purchase orders. Again, typical pharmaceutical companies hold up inventories up to 180 days as opposed to their retail counterparts. Retail drugstores allow inventory holding period up to 60 days or less. (Susarla and Karimi, 2018).

To address drug shortage issues, the study (Liu et al., 2020) suggests that pharmacists and pharmacies must establish active surveillance and warn mechanisms early. However, through observation and research, it is evident that the use of medicines and PPE has increased significantly during this pandemic. Price increases have been observed along with a shortage of pertinent medicines. The medicines that help mitigate Covid-19 effects are assumed to reach a high price. (Tajmim, 2020). That is due to the shortage of suggested drugs and the raw materials being imported. It contrasts with the market situation of antibiotics, wherein price rises were restricted

in 2003. (Haque et al., 2019). However, promoting shortages and price rises were not as high as previously intended.

The short-term consequences of the COVID-19 pandemic include fluctuations in demand, adjustments of regulations, improvements in research and development procedures, and the transition to telecommunications and telemedicine. Besides, the expected long term impacts of the COVID-19 pandemic on the pharmaceutical industry at both global and national levels could be industry growth slowing down, authorization delays, heading towards self-sufficiency in the supply chain of pharmaceutical production, and trend shifts in health-items use along with the ethical dilemma. (Ayati, Saiyarsarai, and Nikfar, 2020).

The pharmaceutical industry in Bangladesh relies greatly on India and China, with 70% of the raw materials coming from both regions. However, since the beginning of January this year, in the wake of the coronavirus epidemic, imports of active pharmaceutical ingredients used to make drugs have almost been halted. The disruption of the supply chain, exacerbated by the current coronavirus outbreak, has thus caused concerns of a shortage of pharmaceutical raw materials among the local drug manufacturers. (Noyon and Tajmim, 2020).

2.3 Development of Hypotheses and Research Framework

For the convenience of this study following hypotheses were developed based on the literature review:

H₁: Improved inventory management due to uncertainty significantly affects retail pharmaceutical inventory management.

H₂: Market syndicate and price hike significantly affect retail pharmaceutical inventory management.

H₃: Easier online purchase system significantly affects retail pharmaceutical inventory management.

H₄: Panic buying and hoarding significantly affect retail pharmaceutical inventory management.

H₅: Delayed delivery significantly affects retail pharmaceutical inventory management.

H₆: Supply Shortage significantly affects retail pharmaceutical inventory management.

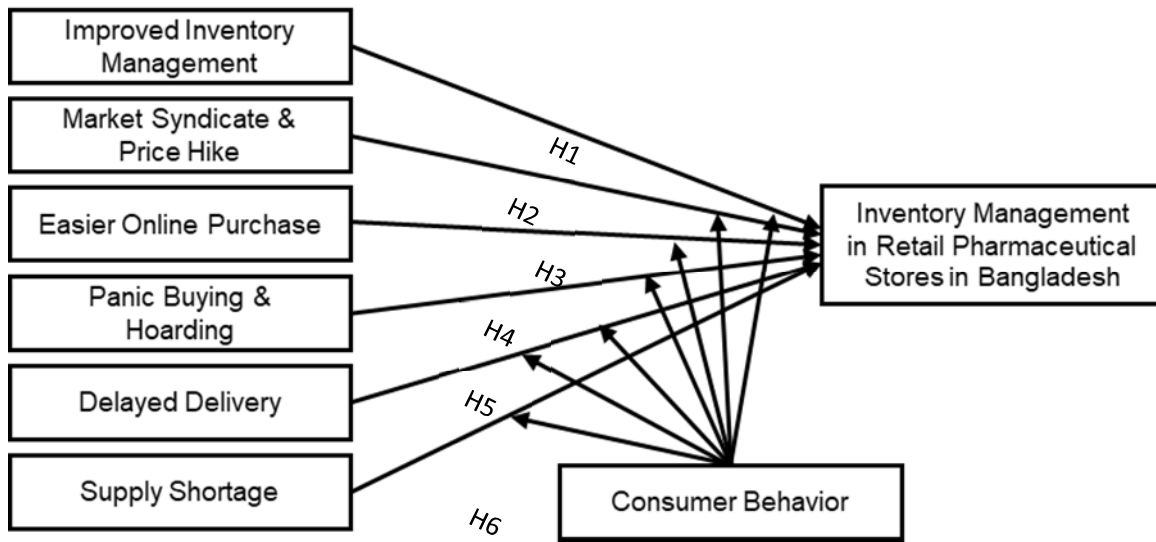


Figure 1: Research Framework

3. Research Methods

The purpose of this paper was to identify the impact of COVID-19 on the inventory management of the retail pharmaceutical industry of Bangladesh. The descriptive research method was used to review the literature and an exploratory research method was used to explore the impact of the pandemic and the mediating role of consumer behavior on inventory management. This paper used both primary and secondary data. The secondary data of this study were collected from books, journals, and newspapers mainly to review the existing literature. Primary data were collected from the employees of retail pharmacies who play a key role in inventory management of retail drug stores.

3.1 Sample and Procedure

The respondents of this study are mainly the managers and staff working in retail pharmacies or drug stores in Bangladesh. We used a self-administered questionnaire and surveyed drug store staff to collect our data. The sample size of this study was determined by using the following formula suggested by Yamane (1967).

$$n = n = N / 1 + N * (e)^2$$

Where, n= Sample Size, N= Population size, e= Level of Precision, in calculating number of sample the following assumptions were made to determine, n=204, if Population Size is more than 100000; Level of precision is 7%. However, this study interviewed 208 retail pharmacy employees from three major cities of Bangladesh which include: Dhaka, Cumilla, and Chittagong. This number is well above the minimum sample size of 204 for employing multivariate analysis

(Hair et al., 1998). Since the study required individuals at different age groups to respond, the non-probability convenience sampling technique was utilized to collect the data, with roughly 250 questionnaires distributed to the respondent working at hundreds of drug stores in Bangladesh.

3.2 Participants

Out of 208 pharmacy staff, 28.8% aged between 36 to 41 years, followed by 24 to 29 years (26%), 18 to 23 years (18.3%), 30 to 35 years (17.3%), and above 41 years (9.6%). However, 66.3% of the samples completed higher secondary level while 75.5% were married. 30.8% of the respondents have 1-3 years of work experience in a retail drug store. We surveyed 123 drug store staff from nine areas of Dhaka city, 58 respondents were from different areas of Chittagong and 27 respondents were surveyed from Cumilla. (Appendix 1).

3.2 Questionnaire Development

A structured questionnaire developed based on the earlier findings from the theoretical and empirical review was used in this study to collect information from the retail pharmacy staff. This study used 31 questions for data collection. Responses to all the questions were measured on a five-point Likert scale with 1 indicating 'strongly disagree' and 5 indicating 'strongly agree'. One of the relative advantages of using this scale is its suitability for the applications of multifarious statistical tools used in marketing and social research study (Malhotra, 1999). Construct validity was measured using convergent validity and construct reliability was measured with Composite Reliability (CR) and Average Variance Extracted (AVE) to identify the suitability of the items for further analysis.

3.3 Test of Unidimensionality, Reliability and Validity

As per (Awang, 2012), we achieved unidimensionality for all the constructs used in this study as the factor loadings were above 0.6. The Confirmatory Factor Analysis (CFA) model was assessed for construct reliability and validity. We use construct reliability to identify the internal consistency among the observed variables. To evaluate the reliability of the data this paper used construct reliability (CR) and average variance extracted (AVE) and the measures were above the cut-off value suggesting adequate reliability. (Hair et al. 1998; Fornell & Larcker, 1981; Henseler, Ringle, & Sinkovics, 2009). (Table 1). The high standardized loadings of the factors also indicate the validity of the model for this research.

3.4 Data Analysis Technique

Data on demographic variables such as gender, age, work experience was processed and analyzed through descriptive analysis. In addition to descriptive statistics, the data were analyzed using inferential statistical techniques such as Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM). The EFA including Principal

component analysis with a varimax rotation was conducted using SPSS version 20. The measurement model, structural model was developed based on the findings of the Confirmatory Factor analysis (CFA) using SPSS AMOS software.

4. Results and Discussions

4.1 Results of Factor Analysis (EFA and CFA)

This paper adopted 4 broadly recognized hypotheses for Exploratory Factor Analysis (EFA) (Hair et al., 1998; Field, 2000): (i) KMO sampling adequacy value above 0.5 (ii) minimum eigenvalue for each factor is 1 (iii) the factor loadings of each measured variable is above 0.40 (iv) the use of varimax rotation as it is the most used orthogonal rotation technique that helps to achieve a simplified factor model. (Field, 2000).

Factor analysis can only be conducted if the Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity value of the dataset are significant. Hair et al., (2010). Table 5 shows that Kaiser's measures of sampling adequacy of this research are 0.925 and Bartlett's test of sphericity is significant ($p=0.000$) which indicates the viability of factor analysis in our research.

Principal Component Analysis (PCA) and the Varimax Rotation approach were applied to derive factors from the 30 independent variables. Given the sample size of 208, standardized factor loadings of 0.40 and higher for evaluative purposes are considered as significant in this research. A six-factor structure was developed based on the eigenvalues of the factors (above 1). These six factors explained 71.65% of the total variance of the dataset. The construct labels were manually developed to represent the underlying characteristics of a specific construct. The 30 items were grouped into six derived factors such as (i) Improved inventory management (ii) Market syndicate and price hike (iii) Easier online purchase (iv) Panic buying and hoarding (v) Delayed delivery (vi) Supply shortage. The outcomes of the EFA indicated that the six-factor structure can be used for further analysis. (Table)

A Confirmatory Factor Analysis (CFA) using Structural Equation Modeling (SEM) was conducted to further validate the findings of the EFA and to assess how well the constructs represent the latent variables. The CFA calculated the standardized estimates of the research items and eliminated variables with lower factor loadings for better model fit. Factor 4 and a very few items which include item V15, V23, V25, V26, V30 were deleted for having lower standardized estimates. (Table 1) The remaining twenty parameter loadings were reassessed for further analysis.

Table 1: Impact of COVID-19 Factors on Pharmaceutical Inventory Management in Bangladesh

Factors	EFA	CFA	AVE	CR
Factor 1: Improved Inventory Management (Total variance=13.861, % of Variance=46.20, Cumulative % =46.20)				
V2. Visits to the retail drug stores declined heavily	.77	.60	0.51	0.87

V9. Customers' demand for non-emergency medicines declined in this pandemic	.67	.51		
V10. The inventory level of my store is tracked down daily	.64	.69		
V11. The inventory holding period is less than 60 days.	.56	.70		
V16. The local pharmaceutical manufacturers have been successful to meet the uncertain demand	.65	.84		
V20. The wholesalers are sent personalized availability reports for emergency deliveries regularly	.53	.70		
V21. The inventory is under active surveillance and warn mechanisms since the pandemic started	.71	.81		
Factor 2: Market Syndicate & Price Hike (Total variance=2.257, % of Variance=7.52, Cumulative % =53.73)				
V7. The prices of certain medicines have increased during pandemic.	.52	.70	0.51	0.80
V18. There has been a price hike of ICU and emergency medicines since the pandemic	.68	.62		
V19. A group of unethical drugstore syndicate created an artificial crisis of medical products	.71	.68		
V22. We use inventory management software in our store which helps us to analyze consumer buying pattern during a pandemic	.63	.81		
V30. Customers' panic buying created unprecedented drug shortage on our shelves	.55	Deleted		
Factor 3: Easier Online Purchase (Total variance=1.747, % of Variance=5.82, Cumulative %=59.55)				
V1. Online purchases are becoming more popular since the beginning of the pandemic.	.66	.66	0.50	0.73
V3. Customers find it easier to purchase medicine online due to the lockdown	.64	.61		
V8. Customers are using cashless payment methods for online medicine purchase to avoid the risk of COVID-19	.55	.79		
V29. Customers are aware of the drug shortage issue.	.57	Deleted		
Factor 4: Panic Buying and Hoarding (Total variance=1.336, % of Variance=4.46, Cumulative % =64.0)				
4. People are willing to spend more in buying medicines amidst pandemic.	.54	Deleted	Deleted	
5. People fell into panic-buying of hand sanitizers, PPE, masks at the beginning of the lockdown	.79	Deleted		
6. People started hoarding face masks, gloves, sanitizers, PPE, and other protective gear	.65	Deleted		
14. Medicines used in hospitals for COVID-19—including respiratory treatments, sedatives, and pain treatments had experienced a massive demand	.60	Deleted		

V28. Customers want certainty in the availability of drugs and preventive products	.65	Deleted		
Factor 5: Delayed Delivery (Total variance=1.20, % of Variance=3.99, Cumulative % =68.0)				
V24. Customers can tolerate delayed delivery due to lockdown.	.79	.73	0.60	0.75
V27 Medicine delivery services tend to purchase only from large retail drugstore chains	.89	.82		
V26. Medicine delivery services are not efficient	.42	Deleted		
Factor 6: Supply Shoprtage (Total variance=1.094, % of Variance=3.65, Cumulative % =71.65)				
V12. We are facing a shortage of imported drugs during this pandemic.	.96	.95	0.81	0.94
V13. The supply of COVID related prescribed medicines are not adequate	.93	.93		
V17. The price of face masks, gloves, sanitizers, PPE, and other protective gear has been high throughout this pandemic	.89	.86		
V25. People are not worried about whether price increases or not.	.85	.85		
V15. We faced a supply shortage of finished pharmaceutical products		Deleted		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy=0.925, df=435, Significant value=0.000				

4.2 Model Fit Indices (CFA)

Several crucial fit indices of our measurement model were examined to assess the overall model fit. Table 2 illustrates the major model fit statistics derived from the CFA outcome. The overall Chi-square value of our model is 518.36 with 160 degrees of freedom. The p-value associated with this outcome is 0.000 which indicates the significance of the value. This paper includes three different types of model fit measures which include: Absolute Fit Measures (AFM), Incremental Fit Indices (IFI), and Parsimonious Fit Indices (PFI). The value of Root Mean Square of Error Approximation (RMSEA), one of the absolute fit indices was found to be 0.08. The value appears to be at the borderline of the threshold 0.08, but is acceptable with 20 observed indicators and a sample size of 208. (Browne & Cudeck, 1993). The other two absolute fit measures chosen for this study are Standardized Root Mean Square Residual (SRMR) and Goodness of Fit Index (GFI). The SRMR value of our model is 0.057 which is way below the cut-off value of 0.08, thus shows an excellent fit of the model. (Hair et al., 2016). Although the GFI value doesn't surpass 0.09 (threshold value), it yet meets the requirements proposed by Baumgartner and Homburg (1995), and Doll, Xia, and Torkzadeh (1994): the GFI value is acceptable if above 0.08.

Our CFA model identified the Comparative Fit Index (CFI) value is 0.906, which exceeds the CFI cut-off value of greater than .90 for a measurement model of such complexity and sample size. (Bentler, 1990). Another incremental fit index (IFI) value 0.907 also indicates a good fit to the data. (Bentler & Bonett, 1980).

The Relative Chi-square of our CFA model is below threshold 5.0 (CMIN/DF =2.7) which represents a good fit of the model. (Marsh and Hocevar, 1985). The other parsimonious fit indices

values (PCFI, PNFI) are also above the recommended value by (Mulaik et al., 1989). Henceforth, all the three types of goodness of fit indices indicated that the overall measurement model was acceptable in this paper which fitted the collected data with a sample size of 208. (Table 2).

Table 2 Model Fit Indices and Their Acceptable Thresholds

Name of category	Fit Indices	Meaning	Value	Recommended Value
Absolute Fit	RMSEA	Root Mean Square of Error Approximation	0.08	RMSEA<0.08
	GFI	Goodness of Fit Index	0.81	GFI>0.90
	SRMR	Standardized Root Mean Square Residual	0.06	SRMR<0.08
Incremental Fit	CFI	Comparative Fit Index	0.91	CFI>0.90
	IFI	Incremental Fit Index	0.91	IFI>0.90
Parsimonious Fit	χ^2/df	Relative Chi-Square	2.70	$\chi^2/df < 5.00$
	PCFI	Parsimonious Comparative fit index	0.75	PCFI>0.50
	PNFI	Parsimonious Normed Fit Index	0.71	PNFI>0.50

Note: RMSEA<0.08 (Browne & Cudeck, 1993); GFI>0.90 (Joreskog & Sorbom, 1993); SRMR<0.08 (Hair et al., 2016); CFI>0.90 (Bentler, 1990); IFI>0.90 (Bentler & Bonett, 1980); $\chi^2/df < 5.00$ (Marsh and Hocevar, 1985); PCFI>0.50, PNFI>0.50 (Mulaik et al., 1989)

4.3 Results of Structural Equation Modeling (SEM)

This paper used a covariance-based Structural Equation model to identify the structural association between the five factors identified by EFA and CFA and the overall impact of COVID-19 on consumer behavior and inventory management in the retail pharma stores of Bangladesh. Table 3 demonstrates the structural parameters' estimates. This research investigates the impact of COVID-19 and consumer behavior related factors like improved inventory management, market syndicate and price hike, easier online purchase, delayed delivery, and supply shortage on the overall inventory management in the retail pharmaceutical stores of Bangladesh.

The path diagram of the SEM demonstrated that all the five factors: improved inventory management ($\beta=0.371$, $p=.000$), market syndicate and price hike ($\beta=0.371$, $p=.000$), easier online purchase ($\beta=0.371$, $p=.000$), delayed delivery ($\beta=0.371$, $p=.000$), and supply shortage ($\beta=0.371$, $p=.000$) have a significant impact on the overall inventory management in the retail pharmaceutical stores of Bangladesh. Hence, hypotheses H1, H2, H3, H5, and H6 are accepted. Hypothesis H4: Panic buying and hoarding significantly affect retail pharmaceutical inventory management, was rejected in the CFA because of low loadings. The findings can be justified as panic buying was witnessed only in the initial stage of the pandemic, it didn't last long. The structural model of

COVID-19 factors and the pharmaceutical inventory management in Bangladesh is shown in Figure 2.

Table 3 Results of Structural Relationships

Factors	Estimate	S.E.	C.R	P	Decisions
Overall <- Improved Inventory Management	.343	.074	4.656	***	Significant
Overall <- Market Syndicate & Price hike	.197	.035	5.542	***	Significant
Overall <- Easier Online Purchase	.466	.093	5.026	***	Significant
Overall <- Delayed Delivery	.487	.083	5.865	***	Significant
Overall <- Supply Shortage	2.167	.237	9.138	***	Significant
R-square	0.65				

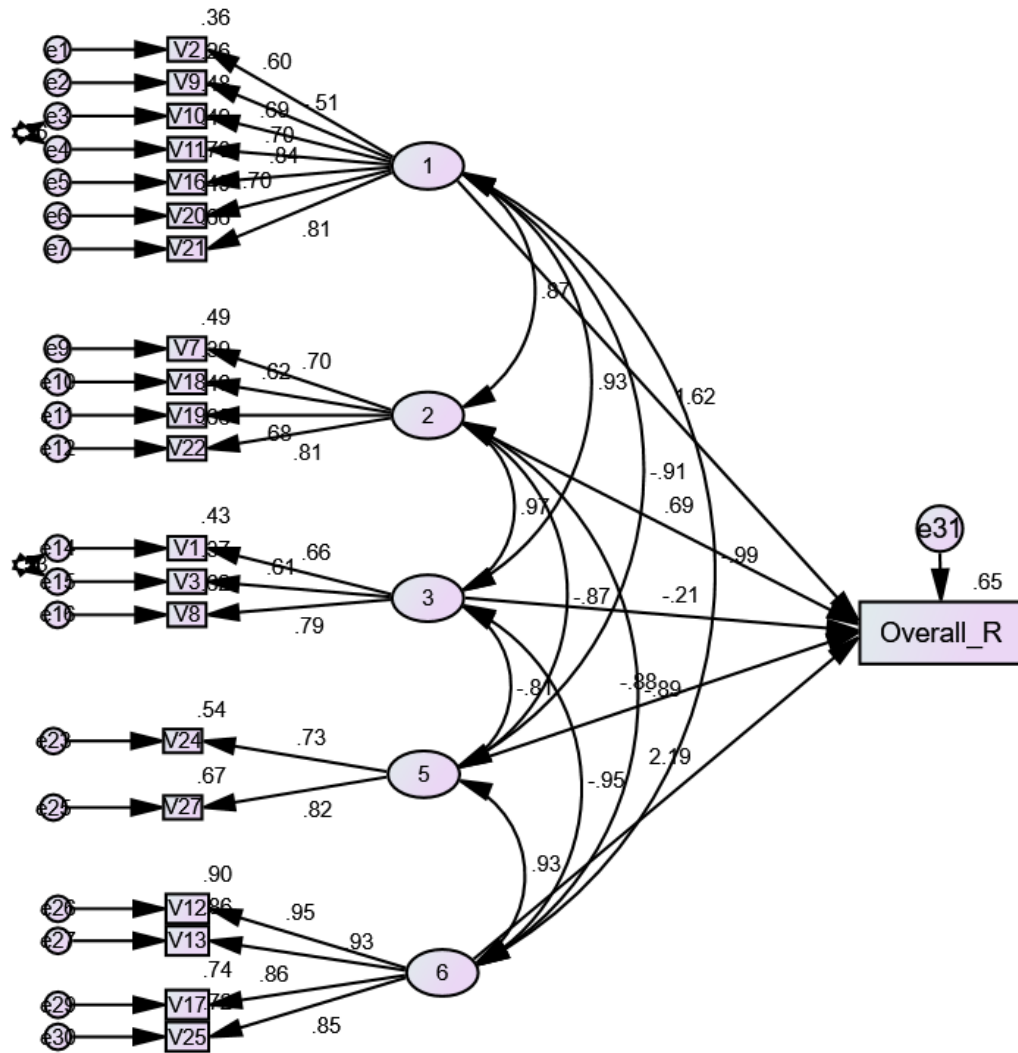


Figure 2: Structural Model of the Inventory Management of the Retail Pharmaceutical Stores in Bangladesh

5. Conclusion and Policy Implications

The unprecedented COVID-19 pandemic has induced global trade, economic, and supply chain disruptions. Bangladesh has been affected equally by this deadly contagion over the past eight months. The supply chain of different industries have been largely disrupted throughout this pandemic. Among them, the retail pharmaceutical supply chain is affected significantly as the COVID-19 has influenced consumer buying patterns. Thus, this research was designed to investigate the impact of COVID-19 and changes in consumer behavior on the inventory management of retail pharmaceutical stores in Bangladesh. The fundamental objective of this

paper to identify the factors evolving from a pandemic, that affect retail pharmaceutical stores' inventory management. The Confirmatory Factor Analysis (CFA) identified five factors that are responsible for inventory management disruptions in the retail drug stores during uncertainty like coronavirus pandemic. The five factors: improved inventory management, market syndicate & price hike, easier online purchase, delayed delivery, and supply shortage were found significantly responsible for the inventory management disruptions in the retail drug stores of Bangladesh.

Diverse contributions will be produced to the expansion of the body of knowledge by this research. First of all, the existing literature will be strengthened concerning the uncertainty and inventory management relationship. This study is the first attempt to test the relationship between a pandemic and inventory management of the retail pharmaceutical industry in Bangladesh. It will also assist the policymakers, pharmaceutical manufacturers, importers, and retailers to develop an efficient inventory management model for uncertainty like COVID-19 Pandemic.

6. Limitations and Directions for Future Research

Despite the serious contributions with respect to the COVID-19 pandemic and inventory management system of the retail pharmaceutical industry, there are still some limitations in this research. First is the nature of selecting the respondent of the sample, only the large pharmacy chain stores and medium-size drug stores of residential areas were visited due to the risk of getting infected by the coronavirus. The drug stores of crowded places were completely ignored. Secondly, the questionnaire of this study was developed based on the prior findings of the empirical studies in this field as there remains a large gap between theory and practice. Lastly, a few of the goodness of fit indices used in our model was at the borderline of the threshold. Future researchers can take into account a larger and diversified sample to get better results. Besides, they can develop better models than ours using more accurate constructs.

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Appendix

Appendix 1: Respondent's Profile

	Frequency	Percent	Valid Percent	Cumulative Percent
Age				
18 to 23	38	18.3	18.3	18.3
24 to 29	54	26.0	26.0	44.2
30 to 35	36	17.3	17.3	61.5
36 to 41	60	28.8	28.8	90.4
Above 41	20	9.6	9.6	100.0
Total	208	100.0	100.0	
Level of Education				
Primary	6	2.9	2.9	2.9
Secondary	19	9.1	9.1	12.0
Higher Secondary	138	66.3	66.3	78.4
Bachelor	45	21.6	21.6	100.0
Masters	208	100.0	100.0	

Marital Status				
Single	51	24.5	24.5	24.5
Married	157	75.5	75.5	100.0
Total	208	100.0	100.0	
Work Experience				
< 1 Years	29	13.9	13.9	13.9
1-3 years	64	30.8	30.8	44.7
4-6 years	34	16.3	16.3	61.1
7-9 years	62	29.8	29.8	90.9
> 10 years	19	9.1	9.1	100.0
Total	208	100.0	100.0	