Influence of Pharmaceutical Marketing Mix Strategies Physician's Prescribing Behavior in Sri Lanka: A Cross-Sectional Study

Sun G. L[*], Jayasekara B.E. A[†]

Abstract

Pharmaceuticals provide vital inputs to healthcare such as medicines, chemicals, vaccines, cosmeceuticals, etc. The pharmaceutical industry is known as the detection, expansion, and production of drugs and medications. Literature revealed that there are deviations on Marketing Expenditure Research and Development (R&D) and Power of Consumer relating to other business sectors that were majorly controlled by physicians. Several research gaps identified both theoretical gaps and methodological gaps within limited studies done in the world thus Sri Lankan studies are curbed in subject area. Therefore this study answers the question "what is the impact of pharmaceutical marketing mix strategies on prescribing behaviors of physicians in Sri Lanka?" main objective of the study to determine pharmaceutical marketing strategies and physician's prescribing behaviors while identifying impact and relationship of pharmaceutical marketing mix strategies on physician's prescribing behavior. Research questions developed parallel to the objectives to derived hypothesis while variables were Physician's prescribing behavior, Marketing mix strategies: product (Dug) attributes, Price of the product or cost of therapy, Distribution and availability of products, promotions done by the pharmaceutical companies in Sri Lanka especially in unique duality of public and private practicing context.

Keywords: *Marketing mix, Pharmaceutical Marketing, Sri Lankan pharmaceutical industry, Physician's prescribing behavior*

Introduction

The history of pharmaceutical industry incurred from druggists that prepared, stored, distributed and sold medicines from plants to chemicals that progressed from civilizations to modern industrial era (Zebroski, 2015) to store routine drugs in non-regulated forms until 1841 formation of Pharmaceutical Society that leads to industrialization in early 19's (Anderson, 2005). Multinationals started conquering other

[*] Lincoln University College, Malaysia: https://orcid.org/0009-0002-6556-5101
[†] Senior Lecturer, Dept. of Science for Technology, Faculty of Technology, University of
Sri Jayawardhanapura

geographies following allopathic treatments and their knowledge distribution. Now pharma industry is universal and there are about world healthcare Organization recognized 40 pharmacopeias available (Wiggins & Albanese, 2019).

Western medicines approached Sri Lanka with European invasions and colonialism over the medical requirement of authorities during their office and evident of manufacturing of basic medication started in 1959 (Morison, 2024) and fairly regulated in 1971 on establishment of State Pharmaceutical Corporation (SPC) and strengthen the free medication policy (State Pharmaceutical Corporation, 2021). Sri Lankan pharmaceutical exports further regularized after the establishment of Cosmetic, Drugs and Devises Authority (CDDA) currently known as NMRA established in 2015 (Atapattu, 1985). There are around 300 registered pharma companies in Sri Lanka with an approximate value of LKR 31.5 Billion with restricted marketing boundaries that companies are not permitted to advertise in mass media (Syandan et al., 2008; National Medicine Regulatory Authority, 2019). As per the World Bank statistics 2022 healthcare expenditure is approximately USD 4.03 Billion (Sun & Jayasekera, 2024) while pharmaceutical expenditure in total is around USD 360 Million (Amarasnghe et al., 2021). Sri Lankan physician workforce is approximately twenty two thousand (22, 0000) including general practitioner to specialist in both private and public sector (De Silva, 2025) as per World Bank Group (2025) physician's density is around 1.19 per 1000 population that situating Sri Lanka in lower middle range of physician resource global availability. Sri Lankan healthcare has a unique duality that most physicians practice in both government and private sectors which makes it an interesting and distinctive characteristic where further research is necessary prior to generalizing global empirical experiences (Rannan-Eliya et al., 2014).

Pharmaceutical industry has an impact of wellbeing in terms of quality of life of individuals, therefore pharmaceutical industry has become a critical and relevant sector of global economy (Scherer, 2000). Pharmaceutical industry is compelled to be excellent in research and development keeping globally physical and mental health with wellbeing of the communities (VanDyke, 2019) nevertheless it has been evident that company's interest is mainly in business looking at the statistics on allocations of budgets that is abnormal to usual allocations in common businesses (Woodside et al., 2018). Pharmaceutical companies spend approximately 26% from their sales against marketing activities though they spend only 16% from sales for research and developments (Murshid et al., 2014).

In pharmaceutical marketing scenario it is different and complicated from other goods and services whereas the consumer never been the customer for the product who is the prescribing physician, thus physician cannot categorize as the opinion leader, since he determines the need of the patient regardless of patient's desire on medicines, therefore consumer behavior models where complex most of the time and that made pharmaceutical companies to work closely with healthcare professionals (Gayaneshwari, 2015). The marketing mix framework conceptualizes strategy from four core elements that are product, price, place and promotion (Kotler et al., 2019; Kotler et al, 2021) in pharmaceutical markets product refers drug efficacy, safety, formulation and brand reputation, price involves affordability and cost of therapy, place refers distribution, supply reliability and accessibility, promotion is about detailing, personal selling, education materials, etc. (Kotler & Armstrong, 1999).

Adoption of the most relevant consumer behavior model for the current scenario required developing a conceptual framework thus physician's prescribing behavior can't be considered into classic four types of buying behaviors (Kotler et al, 2019). This study applies the Stimulus Organism Response (S-O-R) model by Robert Woodworth (Chaudhary et al., 2023) to explain how pharmaceutical marketing-mix strategies influence physician prescribing behavior. Within this framework, product attributes, price, availability and distribution, and promotion are treated as external stimuli. The organism refers to the physician's internal cognitive and professional evaluation of these stimuli, including clinical judgment, perceived therapeutic value, ethical consideration and assessment of prescribing suitability. The response is the physician's prescribing behavior. Thus the S-O-R model is appropriate for the present study hence it explains prescribing behavior not as a direct reaction to marketing related influences (Hailu et al., 2021; Hochreiter et al., 2023), despite of Theory of planned behavior (Liu et al., 2019), Diffusion of innovation theory (Makowsky et al., 2013). Social learning theory (Fugh-Berman, 2021) and social network theory (Fattore et al., 2009).

Pharmaceutical aspects, marketing procedures, healthcare systems, etc. related to healthcare are deferred from countries through continents in the world, therefore various contradictory opinions and research results could be found in literature review thus there are insignificant amount of studies conducted in Sri Lanka for the subject matter. Subsequently this study was conducted, trying to fulfill the gaps and objectives (Sun & Jayasekera, 2024).

Previous studies have examined the relationship between pharmaceutical marketing and physician's prescribing behavior in

different countries. However, findings remain mixed and relative influence of marketing mix elements appears to vary across healthcare systems, regulatory settings and professional contexts. As a result, evidence from one setting cannot be generalized directly to another (Fickweiler et al., 2017; Hailu et al., 2021; Al Thabbah et al., 2022).

This issue remains underexplored in Sri Lanka while Sri Lankan healthcare system has a distinctive dual public-private practice structure, where many physicians are involved in both sectors. Additionally, prescribing decisions are influenced by local regulatory conditions, product availability and affordability concerns. Although a few local studies exist, limited empirical evidence is available on subject matter (Rannan-Eliya et al., 2014; World Bank, 2022).

Accordingly, this study addresses an important contextual gap by examining the influence of product, price, place and promotion on physician's prescribing behavior in Sri Lanka the study contributes by extending empirical evidence to an underexplored setting and by assessing the relative importance of pharmaceutical marketing mix dimensions within the Sri Lankan context (Rannan-Eliya et al., 2014; Hailu et al., 2021).

Research Objectives

1. *To determine the pharmaceutical marketing mix strategies used in Sri Lanka*
2. *To determine the prescribing behaviors of physicians' in Sri Lanka*
3. *To identify the relationship between pharmaceutical marketing mix strategies and prescribing behaviors physicians' in government and private sector.*
4. *To identify the impact of pharmaceutical marketing mix strategies on prescribing behaviors of physicians' in Sri Lanka.*

Global pharmaceutical companies may utilize this study to determine marketing entry strategies for Sri Lanka while existing companies could determine to utilize their financial, human, etc. resources efficiently. Researchers may refer to this study and expand or use this for further studies.

Limitations of Study

The study was done by physical and self-administrative questionnaires distributed all across Sri Lanka to 136 samples thus physicians can be considerably biased towards medical representative's

aspects. Total geographical coverage was absent as per the area of coverage of medical representatives while electronic mood was implemented to mitigate such challenge up to an extent. Only marketing mix factors have evaluated physician's prescribing behavior, which is the only factor under total control of the firm identified after review of available literature that all the other influential factors are not considered.

Methodology

A quantitative cross sectional survey design was adopted and a structured five point Likert scaled questionnaire was distributed both physically and electronically. Research objectives formed after review of 369 articles in the database identifying both theoretical and methodological gaps in the area of studies that also conceded relativity to Sri Lankan context. 300 self-administrative questionnaires were distributed physically and 141 questionnaires were received that have been physically collected and 136 were usable acknowledging the practical barriers such as physician's workload, institutional access restrictions may have influenced participation. Therefore the possibility of non-response bias is recognized and findings are interpreted cautiously since non-responses may affect generalizability of survey findings with mainly quantitative data, to bring conclusions to the research problems (Halbesleben & Whitman, 2012; Meyer et al., 2020). Elaborating and analyzing 1 and 2 research objectives descriptive methods used with tools as mean, median, mode, standard deviation, pie charts, bar charts, histograms, etc. accompanied while evaluating objectives 3 and 4 inferential analysis deployed using ANOVA, Correlation, Regression and Coefficients (*See Research Objectives*).

Previous studies confirm that pharmaceutical marketing can influence physician's prescribing behavior, but findings are mixed regarding which marketing mix elements matter most. Promotion, product factor, price and availability have all been identified as relevant, although their influence appears to vary by context and healthcare setting (Hailu et al., 2021; Al-Areefi et al., 2013; Fickweiler et al., 2017).

However, much of these literature remains descriptive and largely based on evidence from countries other than Sri Lanka. Therefore, limited context-specific evidence exists on how the pharmaceutical marketing mix influences physician's prescribing behavior in Sri Lanka, creating clear need for present study (Rannan-Eliya et al., 2014).

> *H_i- There is a positive relationship between product attributes and physicians prescribing behavior*

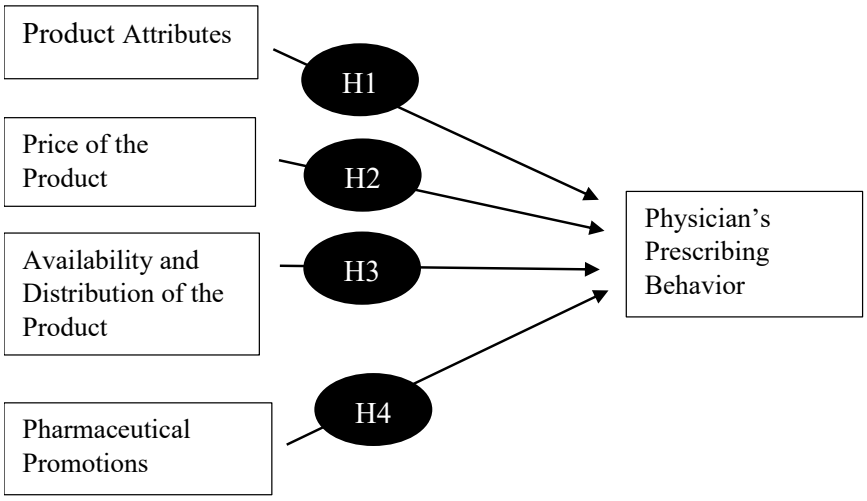
H_2 - There is a positive relationship between Price perception and physicians prescribing behavior

H_3 - There is a positive relationship between place and distribution and physicians prescribing behavior

H_4 - There is a positive relationship between pharmaceutical promotions and physicians prescribing behavior

Based on the hypotheses below conceptual framework was developed

Figure 1: Conceptual Framework



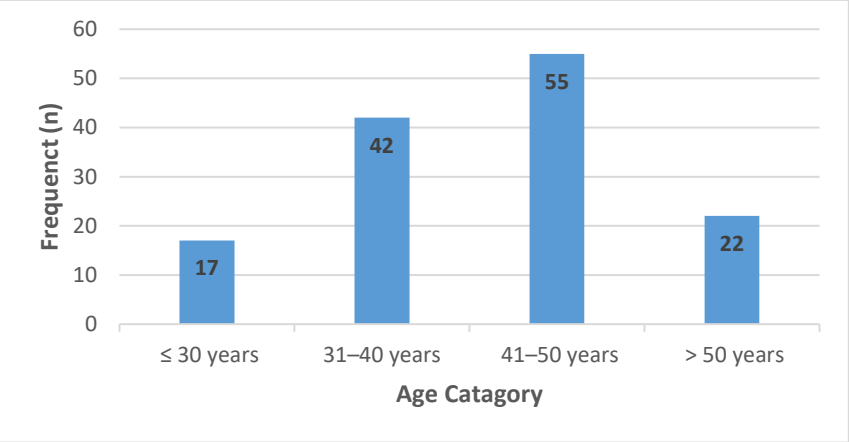
Results

Used IBM SPSS statistics to analyze the set of data and few missing data was replaced by the mean and several variables had few outliers that adjusted through quantile winsorization (Abuzaid & Alkrunz, 2024). All Marketing Mix Strategy components are accepted while place factors demonstrate strongest and promotion factors follow.

Descriptive statistics indicate balanced demographic representation between age, gender and specialty while geographical distribution normality assumptions were satisfied. Skewness and kurtosis values fell within the acceptable thresholds while Q-Q plots and P-P plots demonstrated approximate linearity. Reliability analysis was moderate

internal consistency within constructs with Cronbach's alpha value ranging from 0.32 to 0.60 which is a limitation that indicates weak internal constancy as considering commonly cited threshold of 0.70, that has been considered as a limitation and future research recommendation to be further strengthened while KMO measures ranged between 0.718 to 0.835 and Bartlett's test were significant, having better sample adequacy for analysis (Friebel et al., 2024; Emerson, 2019). Person correlation analysis revealed significant positive relationships in all marketing mix variables and prescribing behavior. Multiple regression analysis indicated that the model was significant, explaining 27.8% of variance in prescribing behavior. Place and promotion factors emerged as significant predictors with no multicollinearity concerns.

Figure 2: Age Distribution of Respondents



Source: Survey Data (2026)

Most of the respondents are 41 to 50 years (40.4%) followed by 31- 40 years (30.9%) while early careers were 12.5% and seniors contributed 16.2% to the study thus 58% and 42% females and males respectively participated.

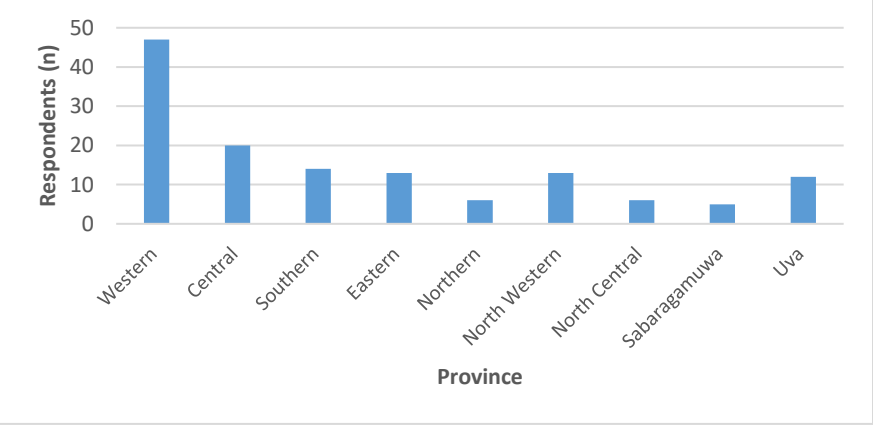
Table 1: Independent Sample T-Test for Physician's Prescribing Behavior vs Gender

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
								95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PPB	Equal variances assumed	.156	.694	.964	134	.337	.07298	.07573	-.07680	.22277
	Equal variances not assumed			.973	124.761	.332	.07298	.07501	-.07548	.22144

Levene's test was not significant highlighting homogeneity of variance and independent sample t-test shows no significance difference that both sexes contribute equally on prescribing behavior which indicates that gender does not significantly influence prescribing behavior.

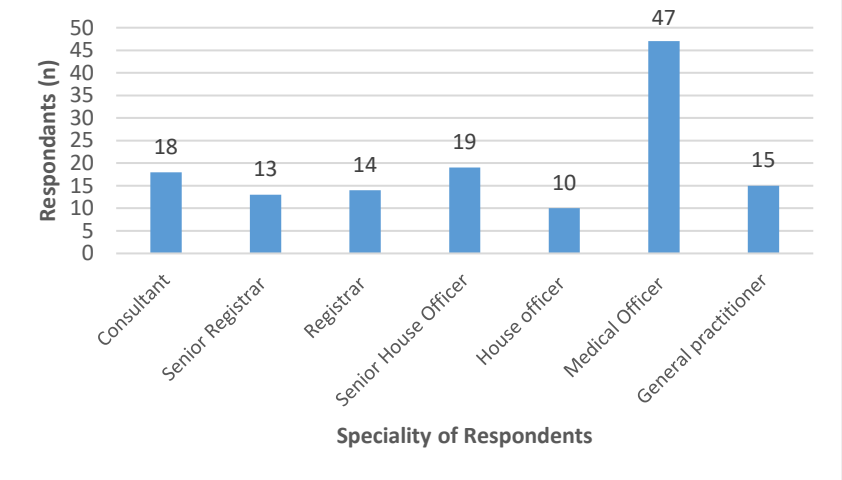
Figure 3: Geographic Distribution of Respondents



Source: Survey Data (2026)

Most of the respondents were from western provinces (34.6%) followed by central provinces (14.7%) thus representation was obtained from all nine provinces that confirms geographic diversity and external validity of the findings.

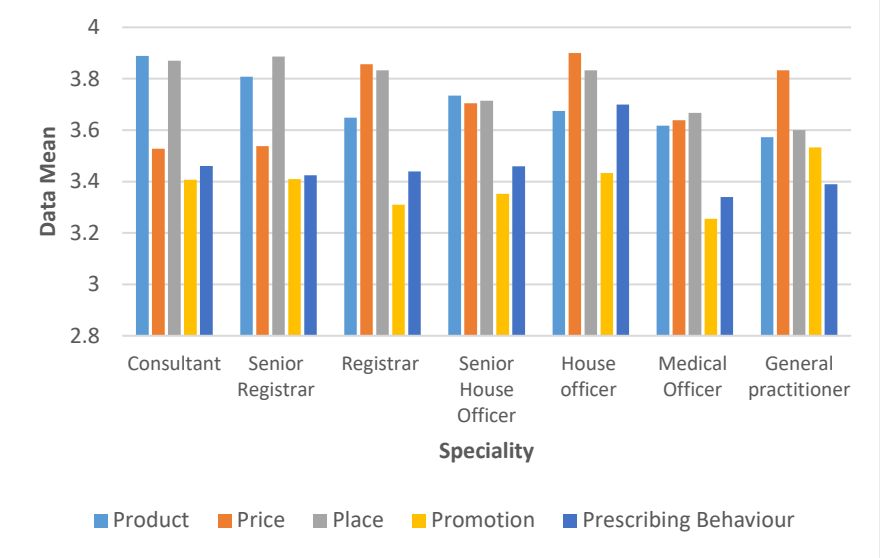
Figure 4: Specialty Distribution of Respondents



Source: Survey Data (2026)

Most of the respondents were medical offices (47) and senior house officers (19) in specialty category consultants and senior registrars are low (10%) due to population distribution thus apparently there are limited numbers of consultants available. There are 21,450 physicians available in Sri Lanka and around 2000 consultants (9%) or specialists among them (Madhavi, 2023). Others are mostly general practitioners who operate in their own medical centers or dispensaries.

Figure 5: Influence on Marketing Mix Strategies in Each Specialty



Source: Survey Data (2026)

Highest mean on prescribing behavior shows in house officers while comparatively lower in medical officers thus house officers are most sensitive to price while general practitioners mostly influenced by the promotions. Consultants and senior registrars are more concerned in product attributes and availability while less concerned in price factor. This suggests prescribing tendencies moderately vary in all specialties with no extreme differences.

Table 2: Normality

Descriptives

			Statistic	Std. Error
Product	Mean		3.6900	.04122
	95% Confidence Interval for Mean	Lower Bound	3.6085	
		Upper Bound	3.7715	
	5% Trimmed Mean		3.6710	
	Median		3.5000	
	Variance		.231	
	Std. Deviation		.48066	
	Minimum		2.50	
	Maximum		5.00	

	Range		2.50	
	Interquartile Range		.75	
	Skewness		.635	.208
	Kurtosis		.126	.413
Price	Mean		3.6971	.04968
	95% Confidence Interval for Mean	Lower Bound	3.5988	
		Upper Bound	3.7953	
	5% Trimmed Mean		3.7034	
	Median		3.6667	
	Variance		.336	
	Std. Deviation		.57933	
	Minimum		2.33	
	Maximum		4.67	
	Range		2.34	
	Interquartile Range		.67	
	Skewness		-.026	.208
	Kurtosis		-.727	.413
Place	Mean		3.7384	.03998
	95% Confidence Interval for Mean	Lower Bound	3.6593	
		Upper Bound	3.8174	
	5% Trimmed Mean		3.7332	
	Median		3.6667	
	Variance		.217	
	Std. Deviation		.46626	
	Minimum		2.67	
	Maximum		4.67	
	Range		2.00	
	Interquartile Range		.67	
	Skewness		.156	.208
	Kurtosis		-.410	.413
Promo	Mean		3.3488	.04857
	95% Confidence Interval for Mean	Lower Bound	3.2528	
		Upper Bound	3.4449	
	5% Trimmed Mean		3.3204	
	Median		3.3333	
	Variance		.321	
	Std. Deviation		.56643	
	Minimum		2.33	
	Maximum		4.71	

		Range		2.38	
		Interquartile Range		.67	
		Skewness		.506	.208
		Kurtosis		-.486	.413
PPB		Mean		3.4230	.03736
		95% Confidence Interval for Mean	Lower Bound	3.3491	
			Upper Bound	3.4969	
		5% Trimmed Mean		3.4177	
		Median		3.4286	
		Variance		.190	
		Std. Deviation		.43566	
		Minimum		2.43	
		Maximum		4.43	
		Range		2.00	
		Interquartile Range		.57	
		Skewness		.168	.208
		Kurtosis		-.302	.413

All variables demonstrate acceptable distribution: skewness values range between -0.277 and 0.628 while kurtosis ranges between -0.441 and 0.583 where these values fall within recommended thresholds for normality to use parametric techniques (Weir & Vincent, 2021). Q-Q plots analysis visualized normal distribution of all residuals (Kim, 2013).

Table 3: KMO and Bartlett's Test for Sample Adequacy

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.749
Bartlett's Test of Sphericity	Approx. Chi-Square	143.998
	df	10
	Sig.	.000

Table 4: Anti-image Matrix for individual Sample Adequacy

Anti-image Matrices

	Product	Price	Place	Promotion	Physician's Prescribing Behavior

Anti-image	Product	.635	-.136	-.199	-.234	.032
Covariance	Price	-.136	.769	-.038	-.129	-.108
	Place	-.199	-.038	.756	-.007	-.190
	Promotion	-.234	-.129	-.007	.608	-.207
	Physician's Prescribing Behavior	.032	-.108	-.190	-.207	.722
Anti-image	Product	.718[a]	-.194	-.287	-.377	.047
Correlation	Price	-.194	.835[a]	-.049	-.189	-.145
	Place	-.287	-.049	.759[a]	-.011	-.257
	Promotion	-.377	-.189	-.011	.728[a]	-.312
	Physician's Prescribing Behavior	.047	-.145	-.257	-.312	.739[a]

a. Measures of Sampling Adequacy(MSA)

The Kaiser Meyer Olkin (KMO) measurements of sampling adequacy was 0.749, indicating good adequacy of the data for multivariate analysis. In addition, Bartlett's test of Sphericity was statistically significant (143.998, $p<0.005$), confirming that the correlation matrix was stable for factor analysis. The anti-image correlation matrix further demonstrates that all individual measures of sampling adequacy (MSA) exceeded 0.70, ranging from 0.718 to 0.835, supporting the adequacy of each variable including the analysis (Hair, 2018).

Table 5: Reliability Analysis

VARIABLE	CRONBACH'S ALPHA	CRONBACH'S ALPHA BASED ON STANDARDIZED ITEMS	N OF ITEMS
PRODUCT	0.550	0.550	4
PRICE	0.603	0.614	3
PLACE	0.343	0.367	3
PROMOTION	0.324	0.317	3
PRESCRIBING BEHAVIOR	0.533	0.534	7

Reliability analysis using Cronbach's alpha levels demonstrates mixed internal consistency across the study constructs. Price showed marginal reliability while product and prescribing behavior demonstrated low reliability. Place and promotion having weak internal consistency. Accordingly, these results were treated cautiously and acknowledged as a limitation of the study (Hair, 2018).

Table 6: Correlation Analysis of Predictors

Correlations

		Product	Price	Place	Promotion	Physician's Prescribing Behavior
Product	Pearson Correlation	1	.388**	.414**	.520**	.285**
	Sig. (2-tailed)		.000	.000	.000	.001
	N	136	136	136	136	136
Price	Pearson Correlation	.388**	1	.261**	.407**	.325**
	Sig. (2-tailed)	.000		.002	.000	.000
	N	136	136	136	136	136
Place	Pearson Correlation	.414**	.261**	1	.313**	.374**
	Sig. (2-tailed)	.000	.002		.000	.000
	N	136	136	136	136	136
Promotion	Pearson Correlation	.520**	.407**	.313**	1	.450**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	136	136	136	136	136
Physician's Prescribing Behavior	Pearson Correlation	.285**	.325**	.374**	.450**	1
	Sig. (2-tailed)	.001	.000	.000	.000	
	N	136	136	136	136	136

**. Correlation is significant at the 0.01 level (2-tailed).

Pearson's correlation analysis showed that all four pharmaceutical marketing mix dimensions were positively and significantly associated

with physician's prescribing behavior. Product showed a weak positive correlation with prescribing behavior, while price, place and promotion demonstrated moderate positive correlations. Among the independent variables, promotion showed the strongest relationship with physician's prescribing behavior, indicating that promotional activities may have comparatively greater association with prescribing decisions than the other marketing mix dimensions though promotion shows weaker Cronbach's alpha (Murshid et al., 2014). P-P plots appeared to be homoscedastic, and absence of multicollinearity confirmed by coefficients table.

Table 7: Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.447	.321		4.511	.000	.813	2.082					
	Product	-.046	.084	-.050	-.541	.589	-.213	.121	.285	-.047	-.040	.636	1.572
	Price	.105	.063	.140	1.674	.097	-.019	.230	.325	.145	.124	.785	1.274
	Place	.235	.077	.251	3.045	.003	.082	.387	.374	.257	.226	.809	1.236
	Promotion	.262	.070	.340	3.761	.000	.124	.399	.450	.312	.279	.673	1.485

a. Dependent Variable: Physician's Prescribing Behavior

Table 8: Model Summery

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.527[a]	.278	.256	.37575	1.720

a. Predictors: (Constant), Promotion , Place, Price, Product

b. Dependent Variable: Physician's Prescribing Behavior

Table 9: ANOVA Table

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.127	4	1.782	12.620	.000[b]
	Residual	18.496	131	.141		
	Total	25.623	135			

a. Dependent Variable: Physician's Prescribing Behavior

b. Predictors: (Constant), Promotion , Place, Price, Product

Multiple regression analysis further showed that the overall model was statistically significant, F (4, 131) = 12.620, p < 0.001explaining 27.8% of the variance in physician's prescribing behavior (R^2= 0.278; Adjusted R^2= 0.256) among the predictors, place and promotion emerged as significant positive predictors, whereas product and price were not statistically significant in the multivariate model. These findings suggest that distribution-related and promotional factors have stronger unique effects on prescribing behavior than product and price related factors in the percent sample (Hair, 2018).

Results revealed that the overall regression model satisfied the assumptions of linearity, normality, and homoscedasticity, as confirmed by Q–Q and P–P plots as well as variance inflation factor (VIF) values, all factors were below 2, indicating no multicollinearity issues (O'Brien, 2007).

Correlation analysis examines the bivariate relationship between each predictor and prescribing behavior separately, whereas multiple regression estimates the unique contribution of each predictor after others are controlled. All correlations were statistically significant while promotion was strongest followed by place factor, confirming that strong perceptions with these marketing mix factors are associated with higher prescribing behavior (Hair, 2018).

Thus, R^2 of 0.278 indicate a modest but meaningful level of explanatory power with is common in social and behavioral research that further indicates prescribing behavior may not be shaped only by marketing mix factors but also by clinical judgment, patent related factors, peer influence, inter professional collaborations, institutional and

healthcare systems (Sun & Jayasekera, 2024; Davari et al., 2018; Ozili, 2023; Gupta et al., 2024).

Conclusion and Recommendations

Descriptive and inferential analysis confirmed that the regression model was statistically significant explaining prescribing behaviors of physicians. Among marketing mix components, place and promotion highlighted significant predictors while product and price did not demonstrate statistical significant independent effects in multivariate analysis. Correlation further indicated that promotion factor had the strongest relationship with prescribing behavior of physicians while other diagnosis confirmed normality, absence of multicollinearity that supports accuracy of findings. Sample adequacy was good, but internal consistency demonstrates weak.

Based on these findings pharmaceutical companies in Sri Lanka should prioritize consistent product availability and enabling efficient distribution systems performing supply reliability thus promotional strategies must focus on ethical evidence based communication. Scientific detailing, transparent clinical data presentations and continues professional education initiatives are likely to establish stronger behavioral impact than the price competition.

Strengthening regulatory efficiency of promotional practices while supporting equitable drug distribution networks would enhance rational prescribing and reduce polypharmacy while further research may explore mediatory factors such as trust, reputation, clinical evidence, pharmacist collaboration and patient knowledge.

Largely prescribing behavior in Sri Lanka appears to be a complex phenomenon shaped by operational accessibility and professional evaluation of quality rather than pricing initiative alone. Thus, recommending comprehensive future studies to understand all the factors influencing physician's prescribing behavior other than marketing mix factors that can gain overall coverage to the area of knowledge.

In summary, the literature suggested that pharmaceutical marketing mix strategies have potential shaping physician's prescribing behavior, but existing evidence is neither fully consistent nor adequately contextualized. While product attributes, price considerations, distribution and availability and promotions have all been identified as relevant influences, there relevant importance differ across healthcare systems, regulatory

environments and professional settings. Besides the limited availability of Sri Lanka-specific empirical evidence reviles a clear contextual gap in the literature. Accordingly, the present study addresses this gap by examining the influence of the core pharmaceutical marketing mix dimensions on physician's prescribing behavior in Sri Lanka.

References

Abuzaid, A., & Alkrunz, I. (2024). A comparative study on univariate outlier winsorization methods in data science context. *Italian Journal of Applied Statistics*, *36*(1), 85–99. https://doi.org/DOI: 10.26398/IJAS.0036-004

Al Thabbah, D. H., Almahairah, M. S., Naser, A. Y., Alrawashdeh, H. M., & Araidah, M. (2022). The effect of pharmaceutical companies' marketing mix strategies on physicians prescribing practices in Jordan: A cross-sectional study. *BMC Health Services Research*, *22*(1). https://doi.org/10.1186/s12913-022-08664-1

Al-Areefi, M. A., Hassali, M. A., & Mohamed Ibrahim, M. I. b. (2013). The role of pharmaceutical marketing and other factors in prescribing decisions: The Yemeni experience. *Research in Social and Administrative Pharmacy*, *9*(6), 981–988. https://doi.org/10.1016/j.sapharm.2012.10.006

Amarasihnghe, Sarasi. N., Fonseka, S. H. S., Dalpatadu, K. C. S., & Ranna-Eliya, R. (2021). *Sri Lanka Health Accounts: National Health Expenditure 1990-2019*. Institute for Health Policy.

Anderson, S. (2005). *Making Medicines: A Brief History of Pharmacy and Pharmaceuticals*. Pharmaceutical Press.

Atapattu, R. (1985). *The Gazette of Democratic Socialist Republic of Sri Lanaka; Extraordinary, No 378/3*. Government Press.

Chudhery, M. A. Z., Safdar, S., Huo, J., Rehman, H.-U., & Rafique, R. (2023). Proposing and empirically investigating a mobile-based outpatient healthcare service delivery framework using stimulus–organism–response theory. *IEEE Transactions on Engineering Management*, *70*(8), 2668–2681. https://doi.org/10.1109/tem.2021.3081571

Davari, M., Khorasani, E., & Tigabu, B. M. (2018). Factors influencing prescribing decisions of physicians: A review. *Ethiopian Journal of Health Sciences*, *28*(6). https://doi.org/10.4314/ejhs.v28i6.15

De Silva, D. (2025). Shifting Paradigms – The Changing Landscape of Sri Lanka's Medical Workforce. *Sri Lanka Journal of Medicine*, *34*(1), 3–7. https://doi.org/10.4038/sljm.v34i1.609

Emerson, R. W. (2019). Cronbach's alpha explained. *Journal of Visual Impairment & Blindness*, *113*(3), 327–327. https://doi.org/10.1177/0145482x19858866

Fattore, G., Frosini, F., Salvatore, D., & Tozzi, V. (2009). Social network analysis in primary care: The impact of interactions on prescribing behaviour. *Health Policy*, *92*(2–3), 141–148. https://doi.org/10.1016/j.healthpol.2009.03.005

Fickweiler, F., Fickweiler, W., & Urbach, E. (2017). Interactions between physicians and the pharmaceutical industry generally and sales representatives specifically and their association with physicians' attitudes and prescribing habits: A systematic review. *BMJ Open*, *7*(9), e016408. https://doi.org/10.1136/bmjopen-2017-016408

Friebel, A. G., Potter, R. E., & Dollard, M. (2024). Health and safety representatives' perceptions of occupational health and safety policy developments to improve work-related psychological health: Applying the theory of planned behaviour. *Safety Science*, *172*, 106410. https://doi.org/10.1016/j.ssci.2023.106410

Gayaneshwari, K. (2015). Influence of pharmaceutical marketing on prescription practices of physicians. *Paripex - Indian Journal of Research*, *4*(9), 133–134.

Gupta, A., Stead, T. S., & Ganti, L. (2024). Determining a meaningful r-squared value in clinical medicine. *Academic Medicine & Surgery*. https://doi.org/10.62186/001c.125154

Hailu, A. D., Workneh, B. D., & Kahissay, M. H. (2021). Influence of pharmaceutical marketing mix strategies on physicians' prescribing behaviors in public and private hospitals, Dessie,

Ethiopia: A mixed study design. *BMC Public Health*, *21*(1). https://doi.org/10.1186/s12889-020-10063-2

Hair, J. (2018). *Multivariate data analysis*. Pearson Education, Inc.

Halbesleben, J. R. B., & Whitman, M. V. (2012). Evaluating survey quality in health services research: A decision framework for assessing nonresponse bias. *Health Services Research*, *48*(3), 913–930. https://doi.org/10.1111/1475-6773.12002

Hochreiter, V., Benedetto, C., & Loesch, M. (2023). The Stimulus-Organism-Response (S-O-R) Paradigm as a Guiding Principle in Environmental Psychology: Comparison of its Usage in Consumer Behavior and Organizational Culture and Leadership Theory. *Journal of Entrepreneurship and Business Development*, *3*(1), 7–16. https://doi.org/10.18775/jebd.31.5001

Kim, H.-Y. (2013). Statistical notes for clinical researchers: Assessing normal distribution (2) using skewness and kurtosis. *Restorative Dentistry & Endodontics*, *38*(1), 52. https://doi.org/10.5395/rde.2013.38.1.52

Kotler, P., & Armstrong, G. (1999). *Principles of Marketing*.

Kotler, P., Keller, K., Brady, M., Goodman, M., & Hansen, T. (2019). *Marketing management*. Pearson UK.

Kotler, P., Keller, K., & Chernev, A. (2021). *Marketing Management*. Pearson.

Liu, C., Liu, C., Wang, D., Deng, Z., Tang, Y., & Zhang, X. (2019). Determinants of antibiotic prescribing behaviors of primary care physicians in Hubei of China: A structural equation model based on the theory of planned behavior. *Antimicrobial Resistance & Infection Control*, *8*(1). https://doi.org/10.1186/s13756-019-0478-6

Madhavi, W. D. S. (2023, November 3). *Doctors' brain drain: Health security concern in Sri Lanka*. Colombo Telegraph. https://www.colombotelegraph.com/index.php/doctors-brain-drain-health-security-concern-in-sri-lanka/

Makowsky, M. J., Guirguis, L. M., Hughes, C. A., Sadowski, C. A., & Yuksel, N. (2013). Factors influencing pharmacists' adoption of prescribing: Qualitative application of the diffusion of innovations theory. *Implementation Science*, *8*(1). https://doi.org/10.1186/1748-5908-8-109

Meyer, V. M., Benjamens, S., Moumni, M. E., Lange, J. F. M., & Pol, R. A. (2020). Global overview of response rates in patient and health care professional surveys in surgery. *Annals of Surgery*, *275*(1), e75–e81. https://doi.org/10.1097/sla.0000000000004078

Morison, J. L. (2024, May 7). *Morison gearing to re-shape pharmaceutical industry in SL by 2030*. Morison. https://www.morison.lk/morison-gearing-to-re-shape-pharmaceutical-industry-in-sl-by-2030

Murshid, M. A., Bin, M. S., Halim, A. B., & Osman, A. B. (2014). Assessing the Relationship Between Marketing Mix Strategy and Physicians' Satisfaction Through Perceived Value in Yemeni Pharmaceutical Industry. *Advances in Environmental Biology*, *8*(9), 622–674.

National Medicine Regulatory Authority. (2019, October 15). *Guideline on advertising of medicines and medicinal products to general public*. Sri Lanka govt. press.

O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity*, *41*(5), 673–690. https://doi.org/10.1007/s11135-006-9018-6

Ozili, P. K. (2023, January 1). *The acceptable R-square in empirical modelling for social science research*. https://mpra.ub.uni-muenchen.de/115769/

Rannan-Eliya, R. P., Wijemanne, N., Liyanage, I. K., Jayanthan, J., Dalpatadu, S., Amarasinghe, S., & Anuranga, C. (2014). The quality of outpatient primary care in public and private sectors in Sri Lanka—how well do patient perceptions match reality and what are the implications? *Health Policy and Planning*, *30*(suppl_1), i59–i74. https://doi.org/10.1093/heapol/czu115

Fugh-Berman, A. (2021). Industry-funded medical education is always promotion—an essay by Adriane Fugh-Berman. *BMJ*, n1273. https://doi.org/10.1136/bmj.n1273

Scherer, F. M. (2000). Chapter 25 The pharmaceutical industry. *Handbook of Health Economics*, *1*(1), 1297–1336. https://doi.org/10.1016/s1574-0064(00)80038-4

State Pharmaceutical Corporation. (2021). *State Pharmaceuticals Corporation of Sri Lanka*. About SPC. http://www.spc.lk/about-spc.php

Sun, G. L., & Jayasekera, B. A. E. (2024). Factors Influencing Physician's Prescribing Behavior: A Comprehensive Review. *Journal of Institute of Human Resource Advancement University of Colombo*, *11*(1), 6–33.

Syandan, T., Kodituwakku, S. S., & Gunaratne, L. H. P. (2008). Influence of marketing mix in prescribing pharmaceutical products in Sri Lanka: A case with ophthalmologists. *Tropical Agricultural Research, 20*(1), 260–268.

VanDyke, E. (2019, October 28). *globalEDGE: Your source for Global Business Knowledge*. globalEDGE. https://globaledge.msu.edu

Weir, J. P., & Vincent, W. J. (2021). *Statistics in kinesiology*. Human Kinetics.

Wiggins, J. M., & Albanese, J. A. (2019, September 15). A brief history of pharmacopoeias: A global perspective. *PharmTech*. https://www.pharmtech.com/view/brief-history-pharmacopoeias-global-perspective-1

Woodside, A. G., Persing, A., Ward, B., & DeCotiis, A. R. (2018). Advertising archetypes' impact on physician engagement and behavior in the context of healthcare products. *Psychology & Marketing*, *35*(7), 533–541. https://doi.org/10.1002/mar.21104

World Bank. (2022). *World Bank document*. https://objects.scraper.bibcitation.com/user-pdfs/2026-04-02/ca104ad0-16d5-423e-b58a-893244afcaa0.pdf

World Bank Group. (2025, April 23). *Sri Lanka Development Update 2025*. World Bank Group. https://www.worldbank.org/en/country/srilanka/publication/sri-lanka-development-update-2025

Zebroski, B. (2015). *A brief history of pharmacy: Humanity's search for wellness*. Routledge.