# SERVICE QUALITY AND BRAND SWITCHING BEHAVIOUR IN PRIVATE HEALTHCARE CENTRES IN UYO, NIGERIA

By

# Israel Alphonsus FINTAN<sup>1</sup> Anietie Benson AKPAN<sup>2</sup> Sunday John AKPAN<sup>3</sup>

<sup>1,2,3</sup>Department of Marketing, Faculty of Management Sciences, Akwa Ibom State University, Obio Akpa campus Nigeria. Corresponding Author's email: <u>fintanisrael@gmail.com</u>

#### ABSTRACT

The study centered on service quality and brand switching behaviour in private healthcare centres inUyo, Nigeria. Three objectives, research questions and research hypotheses were formulated for the study. The population of the study was 210, while the sample size was 138, as determined using Taro Yamane sample size determination technique. Survey research design was used in the study. Using simple linear regression analysis, results from the analysis showed that availability of healthcare personnel and time spent by patients has positive and significant effects on patients' switching behaviour in private healthcare centers in Uyo, Nigeria. It was concluded that service quality has positive and significant effect on patients witching behaviour in the studied healthcare centers in Uyo, Nigeria. The researcher recommended that management of the studied healthcare centers in Uyo metropolis should improve their working conditions as this will help guarantee the availability of healthcare personnel. Also, time spent by patients should equally be reduced across all units as this will help healthcare personnel to cope with their workloads, leading to negative patients switching behaviours.

# *Keywords:* service quality, availability of healthcare personnel, time spent by patients, switching *Behaviour.*

## Introduction

In today's hyper-competitive business landscape, healthcare firms are one of the fastrising organizations in the world with large customer base (Lin and Yin, 2022). Though patients are key part of any healthcare facility, yet, patients have many healthcare options to select from. How well patients are managed in a given hospital significantly determine their healthcare service experience and future patronage (Ramdurai, 2020). Thus, to avoid brand switching behaviour among patients, healthcare organizations are poised to deliver quality healthcare services that could lead to improve corporate performance (Hejazinia and Kazeem, 2014). Consequently, studies on brand switching and service quality have gained increased attention (Ukizentaburuwe, Mukarwego & Kagimbangabo, 2021).

Service quality is seen as patient's subjective comparison between the quality of the services they receive and the actual services s patient receives in reality (Etuk, Uford & Udonde, 2023; Gefan, 2002). To Ford, Sturman and Heaton (2012), service quality entails the difference between the service a consumer expects to receive and the service the consumer actually receives. It explains the ability of a service to meet consumer's expectations, needs and wants. In today's business landscape, service quality has progressively assumed the position of

organizational asset, as it helps organizations to enhance service experiences (Yarimoglu, 2014). When it is properly practiced, features of effective service quality practices include: reliability, responsiveness, empathy, assurance, and tangibility (Parasuraman, Berry & Zeithaml, 1991).

In hospitals, availability of healthcare personnel and patient's arrival time are factors that could determine switching behaviours among patients (Hayat *et al.*, 2020). Non-availability of healthcare personnel could happen due to their shortage in supply or completely not available in a given healthcare facility. However, it happens, Mokoena (2017) argued that, it affects service quality in areas like increased working hours, increased workload and imbalance in the ratio of health personnel to patients in several hospitals. Equally, patient's arrival time explains the time patients arrive at hospitals and are booked for healthcare services or the time patients shows up in need of healthcare services (Appiah, 2019).

Brand switching has been defined as the process of going from one brand to another brand of the same type (Kumar and Chaarlas, 2011). In the words of Fintikasari and Ardyan (2018), brand switching is customer's switch of loyalty from one brand to another. According to Mfon and Uford (2022), brand loyalty is a situation where a customer consistently patronizes a particular brand against other competing brands. Furthermore, brand switching in Nigerian hospitals is reported to be high (Sukawati, 2021). Depending on the type of healthcare services sought by patients, common factors that could increase patients' switching behaviour include: healthcare costs, availability of health personnel, patient's arrival time, among others (Hayat *et al.*, 2020). Patients' switching behaviour, regardless of how it is measured, affects both healthcare personnel's and patients who receive healthcare service themselves. Given these situations, studies in this direction deserve adequate consideration.

#### **Statement of the Problem**

Hospitals, regardless of their types, are designed to take care of patients in an effective and efficient manner. It is undebatable that patients who are provided with quality healthcare services, have better service experiences than patients who are not. To avoid switching behaviours, healthcare facilities are striving to improve their service offerings so as to ensure that patients have better healthcare experience.

Preliminary observation by the researcher showed that there are still increasing cases of switching behaviours among patients in healthcare facilities in Nigeria, regardless of their desire to improve the quality of their service offerings; thus, the need to examine service quality and brand switching in selected private hospitals in Akwa Ibom State.

#### **Objective of the Study**

The main objective of this study was to examine service quality and brand switching behaviour in private healthcare centres in Uyo, Nigeria. Specific objectives of the study are to:

- i. to determine the effect of availability of healthcare personnel and brand switching behaviour in private healthcare centres in Uyo, Nigeria; and
- ii. to ascertain the influence of time spent by patients and brand switching behaviour in private healthcare centres in Uyo, Nigeria.

# **Research Questions**

To achieve the objectives of this study, the following research questions were raised:

i. What is the effect of availability of healthcare personnel on brand switching behaviour in private healthcare centres in Uyo, Nigeria?

ii. What influence does time spent by patients has on brand switching behaviour in private healthcare centres in Uyo, Nigeria?

#### Hypotheses of the Study

The following null hypotheses were formulated for this study:

 $H_{01}$ : Availability of healthcare personnel has no significant effect on brand switching behaviour in private healthcare centres in Uyo, Nigeria; and

 $H_{02}$ : Time spent by patients has no significant influence on brand switching behaviour in private healthcare centres in Uyo, Nigeria.

#### Scope and Limitations of the Study

The conceptual scope of the study comprised of the concept of brand switching, types of brand switching, the concept of service quality, and brand switching behaviours that affect service quality. The geographical scope of the study was Uyo metropolis of Akwa Ibom State. More so, availability of healthcare personnel and patients' arrival time were used as determinants of service quality in the studied hospitals. Furthermore, St Athanasius **Hospital, S**aint Luke General hospital and Our Lady **Hospital formed the selected hospitals used for this study. These hospitals were selected for this study due to their years in operations and proximity to the researcher.** 

#### **Review of Literature**

#### The Concept of Service Quality

In healthcare systems, service quality refers to the gap between patients' expectations and perceptions (Sukawati, 2021). Akpan (2003) submit that service quality in a service rendering firm could be determined using criteria such as: access or receptiveness of the service provider, courtesy, competence, communication with the service provider, credibility of the service rendering firm, reliability, responsiveness, understanding (comprehension), security of the service being provided, and tangibles (physical appearance of facilities). As earlier emphasized, availability of healthcare personnel and time spent by patients are proxies of service quality used in this study.

Availability of Healthcare Personnel: Availability of healthcare personnel is an important indicator of quality healthcare service delivery in hospitals (WHO, 1994). Bergenmar *et al.* (2006) further see it as patients' objective evaluation of the quality of healthcare services they received against their expectations. Hospitals are institutions that provide specialised medical care to patients who are in need of healthcare services of various kinds. As such, hospitals are usually organised into units or departments, with each department charged with the responsibility of providing one specialised healthcare service or the other. Though these specialised departments are characteristically considered as ancillary departments; yet, they offer key time-sensitive healthcare services that contribute to effective diagnosis and treatment of patients with different ailments.

Generally, unavailability of healthcare personnel in healthcare facilities are often inevitable. Regardless of the causative factors, unavailability of healthcare personnel or insufficient healthcare personnel in healthcare institutions has been unequivocally ranked the top concern by patients, specifically in the outpatient department, ahead of staff problems, communication, behaviour and attitude. Healthcare services are traded commodity these days, such that inadequate healthcare personnel will seriously affect the number of clients processed,

and ultimately impact on the services offered by tertiary hospitals (Priya, S. & Devi, 2020). As an important measure of service delivery, unavailability of healthcare personnel directly affects patients' brand switching behaviour, not only in terms of the monetary implications but also the adverse outcomes stemming from patients' dissatisfaction (Akpan, 2003). On the grounds of previous studies, availability of healthcare personnel in hospitals signals quality to patients that wait as well as increase the perceived value of the service (Buell & Norton (2011). Delayed access to health care is assumed to negatively affect health outcomes due to delays in diagnosis and treatment, plus unforeseen cost implications on the patients and public health system (Osundina & Opeke, 2017).

*Time Spent by Patients:* Time spent by patients is an important indicator of effective healthcare service delivery (WHO, 1994). It is defined as the aggregate of time patients' use from registration until the last service they are provided with (Thi & Nhung, 2019). It could also be conceived as the time a patient takes at each service point before being served and the overall time a patient spends in a hospital facility from arrival to the registration desk, till the time of leaving the facility or last service. Patient's arrival time issues affect the operations and performance of any healthcare facilities. Patient's arrival times as expressed in terms of appointment systems can be a source of dissatisfaction, both for the patients and for healthcare providers. From a marketing perspective, protracted wait times that is experienced either through late arrivals could affect patient's satisfaction levels, resulting to a search for another healthcare facility to visit (Stefanie & Indriawati, 2018).

Furthermore, arriving late at the health facility for an appointment has been shown to affect the amount of time a patient spends with a physician and the overall efficiency of healthcare system. The time a patient present to the facility has a direct association with the length of waiting. More so, long waiting times threaten patients' future patronage of a given tertiary hospital and impact directly on the effectiveness of healthcare services being provided. Furthermore, waiting times negatively affect the patients' perception of a particular tertiary hospital as well as decreases the likelihood of word of mouth referral from patients (Jandavath & Byram, 2016). Equally, long waits resulting from any kind of appointment can be both frustrating and agonizing for patients (Leddy *et al.* 2003). Increased length of waiting times frequently induce additional stress for patients who have complicated health ailments.

*The Concept of Brand Switching:* Brand switching occurs when a customer is motivated to review available alternatives due to a change in competitive activity in the marketplace (Appiah *et al.*, 2017). Similarly, Hogan and Armstrong (2001) posited that brand switching is about replacing a product or service with a more valuable one to achieve competitive advantage. Sathish *et al.* (2011), in their words, submit that brand switching reflects that the behaviour of consumers varies, on the basis of their satisfaction levels with providers or companies.

The above conceptual overviews show that brand switching is a process; a systematic action that patients frequently engage in. It gives insight that even if a consumer is loyal to a brand, if the brand does not satisfy his or her needs, the consumer may switch to a competing brand which is a huge sign of customer satisfaction (Akpan, 2003). It is not a one-off action. Rather, it occurs when a customer is motivated to review available alternatives in the marketplace due to a change in competitive activities. Thus, brand switching involves the process of being loyal to one product or service, and switching to another, due to dissatisfaction or any other problems (Akpan, 2003).

#### **Theoretical Framework**

Social influence theory was propounded by Kelman in 1958 was adopted in this study. The theory says that an individual's attitudes, beliefs, and subsequent actions or behaviors are influenced by referent others through three processes: compliance, identification, and internalization. In the words of Kelman (1985), compliance is assumed to occur when individuals accept influence and adopt the induced behavior to gain rewards (or, approval) and avoid punishments (or, disapproval); identification is said to happen when individuals adopt the induced behavior in order to create or maintain a desired and beneficial relationship to another person or a group; while internalization is assumed to occur when individuals accept influence after perceiving the content of the induced behavior is rewarding in which the content indicates the opinions and actions of others.

Patients who visit hospitals have family members, friends and colleagues at work. These individuals equally visit healthcare systems for different ailments. At each time they visit, they often have their own healthcare experiences. A positive and satisfactory healthcare experience may likely motivate them to encourage friends to visit such healthcare systems and vice-versa. Overtime, the affected patient may yield to the social influence of his/her family members, friends and colleagues. Thus, social influence theory serves as the best theoretical underpinning in explaining the rationale behind some patient's preference of one hospital over another.

	Summary of Empirical Review and Gap in Knowledge								
S/N	Authors/Year	Торіс	Methodology	Major Findings	Gap in Knowledge				
1	Lin & Yin (2022).	Impacts of	Cross-sectional	Perceived value,	The reviewed study				
		Service Quality,	survey, Multiple	perceived quality,	differs from the present				
		Brand Image and	regression and	and expected quality	study in terms of				
		Perceived Value	path analysis.	have direct effects	methodology and				
		on Outpatient's		on patient	geographical scope.				
		Loyalty to		satisfaction and					
		China's Private		have indirect effects					
		Dental Clinics		on patient loyalty,					
		with Service		and patient					
		Satisfaction as a		satisfaction is a					
		Mediator.		mediator.					
2	Sukawati (2021).	Hospital Brand	Simple random	Hospital brand	Both studies differ in				
		Image, Service	sampling	image positively and	terms of geographical				
		Quality, and	technique and	significantly	scope.				
		Patient	regression	influences patient					
		Satisfaction in	analysis.	satisfaction.					
		Pandemic							
		Situation.							
3	Yang & Park (2021)	Analysis on	Structural	Waiting time did not	Structural Equation				
		Relationship	Equation	affect perceived	Modeling (SEM) was				
		between Waiting	Modeling (SEM)	waiting time.	used in this study.				
		Time and	_	_	_				
		Customer							
		Satisfaction of							
		General							
		Hospitals, Korea.							
4	Amporfro et al.	Patient's	Survey research	Maternal related	The reviewed study				
	(2021).	satisfaction with	design and	issues showed	differs from the present				
		healthcare	descriptive	positive relationship	study in terms of				

#### **Empirical Review**

Summary	of Emp	oirical	Review	and (	Gap i	n Kno	wledge
---------	--------	---------	--------	-------	-------	-------	--------

		delivery in Ghana.	analysis.	with patient's satisfaction in the studied hospitals.	research objectives, methodology and geographical scope.
5	Omona <i>et al.</i> (2021)	Factors Associated with Patient Satisfaction to Healthcare at Mpigi Health Centre IV, Mpigi District-Uganda.	Cross-sectional research design and descriptive analysis.	Most of the patients believed that healthcare services in the hospital was just fair.	The reviewed study differs from the present study in terms of research objectives, methodology and geographical scope.
6	Ekene, Mojekeh & Anyasor (2021).	Determinants of Brand Switching Behaviour in Mobile Telecommunicati on Industry in South-South Nigeria.	Survey research design, Cochran Method of determining sample size and descriptive analysis.	Network coverage, price, service quality and customer service have significant positive influence on consumer brand switching behaviour in mobile telecommunication in South-South zone, Nigeria.	This reviewed study differs from the present study in terms of methodology and geographical scope.

#### Methodology

Survey research design was used in this study. Descriptive survey research design involves making use of structured questionnaire that are structured with open-ended questions. The population of the study was 210 patients that were selected from the private hospitals in Uyo metropolis of Akwa Ibom State. Three private hospitals which was selected for the study are St. Athanasius hospital, Saint Luke general hospital and our lady hospitals. A total of 138 patients of the selected private hospitals were used as the sample size for this study.

#### **Data Analysis and Interpretation of Findings Hypothesis 1**

 $H_{01}$ : Availability of healthcare personnel has no significant effect on brand switching behaviour in private healthcare centres in Uyo, Nigeria.

**Table 1**:Summary of Simple Linear Regression Showing the Effect of availability of healthcare<br/>personnel on brand switching behaviour in private healthcare centres in Uyo, Nigeria.

personner on orand switching benaviour in private nearlicate centres in 0 yo, Nigeria.					
	$\mathbf{B}_1$	SE	$\mathbf{B}_2$	t-value	Significant
					(2 tailed)
Constant	4.133	.349		11.827	.000
Availability of Healthcare Personnel $(X_1)$	0.644	.030	.759	21.606	.000
Dependent Variable: Brand Switching					
Behaviour.					
R =	0.759				
$R^2 =$	0.688				
Adjusted R-Square =	0.574				
Std. Error of estimate =	1.50330				
F-statistics =	466.809				
Probability (Significant p-value) =	0.000				

\*significantly related at 5% (p<0.05).  $B_1$ = unstandardized beta,  $B_2$ = standardized beta, SE= standard error. **Source:** The Researcher's Computation (2024).

Table 1 shows a regression coefficient of  $R^2 = 0.688$  which means that the independent variable availability of healthcare personnel accounted for 68.8% of the variation in brand switching behaviour in private healthcare centres in Uyo, Nigeria. In addition, the significant F-ratio at F = 466.809 and p-value = 0.000 suggests that availability of healthcare personnel significantly predicted brand switching behaviour in private healthcare centres in Uyo, Nigeria. To determine the degree of change between the independent variable and the dependent variable, the value of the beta coefficients for availability of healthcare personnel had a statistically significant coefficient of  $\beta x_1 = 0.644$  and p-value = 0.000, indicating that every unit change in availability of healthcare personnel will result to a 64.4% increase in brand switching behaviour in private healthcare centres in Uyo, Nigeria, with all other factors been held constant. With reference to the decision rule, since the generated p-value (0.000) is less than 0.05 (p-value = 0.000<0.05), the null hypothesis is rejected.

#### Hypothesis 2

 $H_{02}$ : Time spent by patients has no significant on brand switching behaviour in private healthcare centres in Uyo, Nigeria.

Table 2:	Summary of Simple Linear Regression Showing the Effect of availability of Time
	Spent by Patients on brand switching behaviour in private healthcare centres in Uyo, Nigeria.

	<b>B</b> 1	SE	<b>B</b> <sub>2</sub>	t-value	Significant (2 tailed)
Constant	2.296	.082		27.857	.000
Time Spent by Patients (X <sub>2</sub> ).	0.561	.027	.589	9.721	.000
Dependent Variable: Brand Switching Behaviour.					
R =	0.589				
$\mathbf{R}^2 =$	0.547				
Adjusted R-Square =	0.343				
Std. Error of estimate =	0.34937				
F-statistics =	94.501				
Probability (Significant p-value) =	$0.000^{b}$				

\*significantly related at 5% (p<0.05).  $B_1$ = unstandardized beta,  $B_2$ = standardized beta, SE= standard error. **Source:** Researchers Computation (2024).

Table 4.9 shows a regression coefficient of  $R^2 = 0.547$  which means that the independent variable accounted for 54.7% of the variation in brand switching behaviour in the studied private healthcare centers. In addition, the significant F-ratio at F = 94.501 and p-value = 0.000 suggests that time spent by patients significantly predicted brand switching behaviour in the studied private healthcare centers. To determine the degree of change between the independent variable and the dependent variable, the value of the beta coefficients for time spent by patients had a statistically significant coefficient of  $\beta x_1 = 0.561$  and p-value= 0.000, indicating that every unit change in time spent by patients will result to a 56.1% increase in brand switching behaviour in the studied private healthcare centers, with all other factors been held constant. With reference to the decision rule, since the generated p-value (0.000) is less than 0.05 (p-value =0.000<0.05), the null hypothesis is rejected.

## Conclusion

The study made the following conclusions:

i. Availability of healthcare personnel has a positive and significant effect on patients switching behaviour in the selected private healthcare centers in Uyo, Nigeria; and

ii. Time spent by patients has a positive and significant effect on patients switching behaviour in the selected private healthcare centers in Uyo, Nigeria.

## Recommendations

Based on the findings of this study, the following recommendations were made:

- i. Management of the studied private hospitals should improve their working conditions as this will help guarantee the availability of healthcare personnel; and
  - ii. Time spent by patients should equally be reduced across all units this will help healthcare personnel to cope with their workloads, leading to negative patients switching behaviours.

#### References

- Akpan, A. (2003). Marketing strategy: Concepts and applications (Second Edition). Zaria, Nigeria: Isola Ola & Sons.
- Amporfro, D., Boah, M., Yingqi, S., Wabo, T., Zhao, M., Nkondjock, V. & Wu, Q. (2021). Patient's satisfaction with healthcare delivery in Ghana. *BMC Health Services Research*, 21(722), 1-13.
- Appiah, D., Ozuem, W., Howell, K. & Lancaster, G. (2019). Brand switching and consumer identification with brands in the smartphones industry. *Journal Consumer Behaviour*, 18,463-473.
- Ekene, A., Mojekeh, M. & Anyasor, O. (2021). Determinants of brand switching behaviour in mobile telecommunication industry in South-South Nigeria. *International Journal of Business & Law Research*, 9(1), 59-66.
- Enabulele, O., Ajokpaniovo, J. & Enabulele, J. (2018) Patient waiting and consultation time in the general practice clinic of the university of Benin teaching hospital, Edo State, Nigeria. *Journal of Family Medicine and Community Health*, 5(2), 1146.
- Etuk, A. J., Uford, I. C., & Udonde, U. E. (2023). Airline Service Recovery Strategies and Passengers' Satisfaction in Nigeria. *International Journal of Business Management and Economic Review*, 6(4), 1-18.
- Fintikasari, I. & Ardyan, E. (2018). Brand switching behaviour in the generation Y: Empirical studies on smartphone users. *Jurnal Manajemen Dan Kewirausahaan*, 20(1): 23-30.
- Ford, R., Sturman, M. & Heaton, C. P. (2012). Managing quality service in hospitality: How organizations achieve excellence in the guest experience. New York: Delmar, Cengage Learning, Clifton Park.
- Gefan, D. (2002). Customer loyalty in e-commerce. Journal of the Association of Information System, 3(1), 27-51.
- Hayat, U., Gunathilake, M., Dissanayake, M., Senamanthila, D. & Samaradiwakara, P. (2020).
  Factors affecting brand switching behaviour of millennials: Experience from the Sri Lankan telecommunication industry. *South Asian Journal of Marketing*, 1(2), 47-73.
- Hejazinia, R. & Kazemi, M. (2014). Prioritizing factors influencing customer churn. Interdisciplinary Journal of Contemporary Research in Business, 5(12): 227-236.
- Hogan, E. & Armstrong, G. (2001). Toward a resource based theory of business exchange relationships: the role of relational asset value. *Journal of Business to Business Marketing*, 8(4), 3-28.
- Kumar, R. & Chaarlas. D. (2011). Brand switching in the cellular phone service industry because of bill related Issues faced by clients. *International Journal of Event Management Research*, 1(5), 231-235.

- Lin, W. & Yin, W. (2022) Impacts of service quality, brand image, and perceived value on outpatient's loyalty to China's private dental clinics with service satisfaction as a mediator. Retrieved from <u>https://doi.org/10.1371/journal.pone.0269233</u> on 12/06/2024.
- Lytle, R. & Mokva, M. (1992). Evaluating health care quality: the moderating role of outcomes. *Journal of Health Care Mark. 12(1), 460-469.*
- Mfon, A., & Uford, I. C. (2022). consumer preference survey of de choice fast food in uyo metropolis, Akwa Ibom State, Nigeria. *British Journal of Marketing Studies*, 10(2), 13-34.
- Mokoena, M. (2017). Perceptions of professional nurses on the impact of shortage of resources for quality patient care in a public hospital: Limpopo province. Master of Arts, University of South Africa.
- Omona, K., Nakand, L., Nambi, A., Nakayiza, F., Nanozi, M., Namuli, M. & Zimbe, R. (2021) Factors associated with patient satisfaction to healthcare at Mpigi health center IV, Mpigi district-Uganda. *Cognizance Journal of Multidisciplinary Studies*, 11(4), 1-12.
- Parasuraman, A., Berry, L. & Zeithaml, V. (1991) Understanding customer expectations of service. Sloan Management Review 32 (3), 39-48.
- Priya, S. & Devi, D. (2020). Effective Doctor Patient Communication in a Healthcare Service Delivery. *Solid State Technology Journal*, 63(6), 1-8.
- Ramdurai, B. (2020). Growing importance of patient engagement in healthcare. *International Journal of Nursing and Health Science (SSRG-IJNHS)*, 6(3), 1-9.
- Sathish, M., Kumar, K., Naveen, K. & Jeevanantham, V. (2011). A study on consumer switching behaviour in cellular service provider: A study with reference to Chennai. Far East Journal of Psychology and Business, 2(2), 71-81.
- Stefanie, F. & Indrawati, R. (2018). Correlation of outpatient waiting time with patient's satisfaction and loyalty at private hospital. *International Advanced Research Journal in Science, Engineering and Technology*, 5(10), 20-25.
- Sukawati, T. (2021). Hospital brand image, service quality, and patient satisfaction in pandemic situation. *Jurnal Medicoeticolegal dan Manajemen Rumah Sakit*, 10 (2), 120-127.
- Ukizentaburuwe, J., Mukarwego, B. & Kagimbangabo, K. (2021). Waiting time and associated factors among outpatients at Kibungo referral hospital, Rwanda. *Rwanda Medical Journal*, 78(2), 40-48.
- World Health Organisation (2008). Hospital advisory group: A review of the determinants of Hospital Performance. Geneva.
- Yang, J. & Park, A. (2021). Analysis on relationship between waiting time and customer satisfaction of general hospitals. *Natural Volatiles & Essential. Oils*, 2021; 8(4), 1079-1088.