ASSESSMENT OF FACTORS INFLUENCING THE UTILIZATION OF LABORATORY SERVICES ON PUBLIC PRIMARY HEALTH CARE SERVICES IN MAKKAH AL-MOKARRAMAH CITY, SAUDI ARABIA IN 2022

Jamil A Serdar[1*], Ahmad Nabeel Khawandanah[2], Riyadh Naif Saleh Faydah[3], Sultan Musaad Alsharif[4], Khaled Ibraheem Alqurashe[5], Hamid Musaad Zaid Alsharif[6], Zaid Musaad Zaid Alsharif[7], Bassam Mohammed Saleh Bandugh[8], Abdulrahman Khalid Y Alzamzami[9], Rahaf Mustafa I Albensari[10], Hussain Mousa Alzahrani[11], Mutaz Mohammad Alandonisi[12], Walid Ahmad Mohammad Alkhairi[13], Naif Nagi Alsubhi[14]

Abstract:

Background: In resource-constrained settings, primary health centers (PHCs) are critical for universal health coverage. Laboratory service is one of its important components. While PHC and its performance are focused, its laboratory service has been neglected in developing countries.

A routine checkup is a general physical evaluation and is not performed for a specific injury, illness or condition. A routine checkup in laboratory service is one of its important components are beneficial for detecting diseases in early stages when treatments are most effective. In the Kingdom of Saudi Arabia (KSA), free-of-charge healthcare services including the analysis to be carried out in laboratories are offered to citizens. However, studies are consistently finding that Saudi people are not taking advantage of the free routine checkups. Two survey studies one involving a nationally representative sample of Saudi adults and the other involving Saudi students studying in the Saudi or out of Saudi found that three-quarters of the participants had never had a routine checkup. A third study reported that 65.7% of Saudis had never had a routine checkup in laboratory. **Aim of the study**: To assess Assessment of Factors Influencing the Utilization of laboratory services on Public Primary Health Care Services in Makah Al-Mokarramah City, Saudi Arabia in 2022. **Methods:** A cross-sectional study was conducted on laboratory services on Public Primary Health Care center in Makah Al-mokarramah 2022 Saudi Arabia. The study employed a self-administered questionnaire to collect data from patients attending both public PHC centres (or outpatient clinics) in Makkah city. The questionnaire was designed to collect data on a number of variables related both to health services users and providers. Descriptive statistics socio-demographic and medical data were used to determine the significant variables which may influence the utilization of this service. **Results:** most of the participants (35.0%) were in the age group 50-60 years the majority of them were males (66.0%) also majority of participant are Saudi were(82.0%) majority of participant married were (67.0%), also the patient's with satisfaction and heave a significant relation between the satisfaction and frequency while P-value <0.001 and X^2 35.363, **Conclusion** Focus on laboratory services is needed to enhance the existing PHCs performance. Skill-up gradation of existing could help in improving the contribution of the existing laboratories in PHC functioning.

Keywords: Knowledge, Attitudes, Practices, type 2 diabetes, physical activity, primary health care center, Makkah al-mokarramah

[1*]Consultant family medicine, Al Zahir PHC in Makkah, Saudi Arabia.

[2]Family medicine specialist, Aleskan PHC, Healthcare Makkah cluster, Saudi Arabia.

[3]General practitioner, MOH Al Mansour PHC, Saudi Arabia.

[4]Pediatric specialist, Althager hospital, Saudi Arabia.

[5]Family medicine and diabetes consultant, MHC -Alnoor hospital, Saudi Arabia.

[6]Medical Registrar, King Abdulaziz Hospital Jeddah Ministry of Health, Saudi Arabia.

[7]Family Medicine Resident, Ministry of Health, Jeddah, Saudi Arabia, Saudi Arabia.

[8]Senior Registrar Family Medicine, Family Medicine Academy, Saudi Arabia.

[9]GP Family Medicine, Public health in Makkah cluster, Saudi Arabia.

[10]Specialist Family Medicine, Alnor hospital in Makkah, Saudi Arabia.

[11]Nursing Specialist, Aleskan Phc, Saudi Arabia.

[12]General physician, Aleskan Primary health care, Saudi Arabia.

[13]Specialist health Administration, Administration of Academic Affairs and Training in the Health Cluster in Makkah Al-Mukarramah, Al Noor Specialist Hospital, Saudi Arabia.

[14]Nursing technician, Health Cluster in Makkah Al-Mukarramah, Saudi Arabia.

*Corresponding Author: Jamil A Serdar
*Consultant family medicine, Al Zahir PHC in Makkah, Saudi Arabia.

Introduction

Medical laboratories are an essential component of effective health care systems. Laboratory results must be accurate and reliable to ensure that subsequent medical decisions made by physicians will lead to the best possible outcomes for the patient [1]. The result should also be delivered in a timely manner, as physicians often prefer empirical diagnosis to delayed diagnosis [2]. However, because access to quality testing is severely limited or undervalued, misdiagnosis commonly occurs, leading to inappropriate treatment and increased morbidity and mortality [3, 4]. Therefore, there is a growing need to improve the quality of laboratory services that would enhance service utilization and patient outcomes. Analyzing the of factors Influencing the Utilization of laboratory services on Public Primary Health Care Services public PHC centres and private outpatient clinics contributes to an understanding of the factors driving the development of both health care sectors [5]

Good functioning of PHC plays an important role in utilization of its services by the masses [6]. Laboratory service is recommended as an important component for good functioning of PHC. Studies have been focused on laboratory service in PHC regarding its type, quality [7], functioning, utilization and relevance in disease control [8]. Despite such focus on PHC laboratory in the literature, PHCs lack a laboratory technician (LT) to run the laboratory [9]. It is an important issue because PHC laboratory is the only diagnostic facility for people living in developing countries [10].

Theoretical considerations suggest that Utilization of laboratory of such health facilities may be influenced by a range of factors including those which relate both to the individuals using the Utilization of laboratory service and the providers of the eservices, as part of a health care system, Utilization of laboratory primary health care has enormous importance in the delivery of health care [11]. It has this importance because the primary health care facility is the first point of care and a major conduit for the delivery of health care to a significant proportion of the population [12]

A study by Planning Commission on PHCs has used parameters like outpatient department (OPD) visits, number of institutional deliveries or program-specific indicators as parameters to measure the PHC performance [13]. Field experience indicates that district health officials may evaluate the PHC performance primarily for the non-laboratory outcomes like OPD visits and Maternal and Child Health services [14]. This suggests that policy-makers may not be adequately convinced with laboratory relevance to ensure LT in all PHCs. One of the reasons could be lack of literature explaining association between laboratory services and PHC performance [15]. The knowledge of this association is important, especially in resource-limited health system settings, because policy-making is influenced by PHC overall performance rather than only laboratory performance [16]. In Saudi Arabia, the laboratory structure is integrated with the health care tier, which includes health centres and district, general and specialized hospitals [17]. The country has made significant advances in rapidly expanding access to health care in recent years [18]. There have been substantial efforts aimed at improving quality, including the WHO-AFRO's stepwise accreditation of laboratories [19]. However, the quality performance improvements achieved thus far remain inconsistent, and the actual impact on users' outcomes largely remains unclear [20]. Customers' satisfaction survey enables managers to link the current status of laboratory quality improvement with real customers' expectations [21]. Laboratories are thus expected to regularly conduct customer satisfaction assessments to achieve or maintain accreditation status, but this is not common in resource-limited countries [22].

Literature Review

Studies in Saudi Arabia majority of clinicians were satisfied with the laboratory services. This finding is not far from the studies conducted in eastern Saudi Arabia [23] and southwest Ethiopia [24], Tanzania, the finding appeared higher than studies conducted in southern Ethiopia [24], public hospitals of Ethiopia [26], Gondar, Addis Ababa and Nekemte, Ethiopia [27], and a maternity hospital in Saudi Arabia [28]. However, those studies covered only hospitals, not primary health centres, or only physicians, not all clinicians. On the other hand, the finding is lower than the

findings of the Q-Probes studies performed in the USA [29]. The discrepancy with these studies reflects the better service quality and user experiences in such resource-rich settings with more advanced diagnostic facilities.

In the study, the strong positive correlation was obtained between laboratory service-related parameters and overall hospital performance (composite of patient results, staff and work system result, hospital efficiency and effectiveness result and flexibility performance) for Jordanian Hospitals [30]. The study on US hospitals showed that clinical technology inclusive of laboratory technology drives the hospital clinical quality and financial performance [31].

Jain et al, 2015 reported the level laboratory service in PHC was not found to be a significant predictor of overall PHC performance in multivariate analysis, which was unexpected. Further, the large confidence interval indicates that some precautions are needed in interpreting the absolute effect of LLS in PHC performance [32]

These findings suggest that LLS in PHC could be a strong trigger to improve the PHC performance, but alone it is not an enough condition to improve the PHC performance.

Patient could access public laboratory facility only on referral from medical doctor . Thus, the laboratory can help the physician in better decision-making, which could lead to better PHC performance. The literature had suggested that laboratory results could contribute up to two-third of medical decision-making [33]. Further, the literature had identified various reasons that could disrupt laboratory role in PHC like lack of resources and medical laboratory motivation [34].

WHO Guide (2015) Laboratory users' guidebook is important to communicate relevant information and instructions to users. In the study, the helpfulness of the handbook was the lowest-rated aspect (3.3), and most clinicians lacked a handbook (75.1%). This finding is consistent with studies where most physicians were dissatisfied with the availability or ease of understanding the handbook [35].

Rationale

According to the researcher's knowledge, There was no much research about Factors Influencing the Utilization of laboratory services on Public Primary Health Care Services in Makkah al-mokarramah City, the laboratory services could be investigated from the health care worker perspective, such as the availability of ordered tests, courier services, availability of a helpful user guidebook, courtesy and respect, laboratory report format, turnaround time (TAT) of results, notification of critical results, and reliability of results . Previous studies in Saudi Arabia have shown that health care worker and physicians were most dissatisfied with the provision of timely results, advisory services and notification of panic values, including the behavioural manners of providers. However, many argue the validity of user satisfaction as a measure of quality, particularly technical aspects, as users could be more sensitive to behavioural aspects . Previous studies have rarely explored health care workes clinicians' satisfaction in relation to objective measures of laboratory practice

Aim of the study:

To assess Assessment of Factors Influencing the Utilization of laboratory services on Public Primary Health Care Services in Makah al-mokarramah City, Saudi Arabia in 2022.

Methodology:

Study design :This study is descriptive cross-sectional study was conducted among 300 participant of the was conducted on laboratory services on Public Primary Health Care center in Makah al-mokarramah 2022 Saudi Arabia, was conducted from May to June 2022 in makkah al-mokarramah, PHC centers under supervision of Directorate of Health Affairs of Makkah Al-Mukarramah in Saudi Arabia..

Study Area

The study has been carried out in the city of Makkah Al-Mokarramah Makkah is the holiest spot on Earth. It is the birthplace of the Prophet Mohammad and the principal place of the pilgrims to perform Umrah and Hajj. It is located in the western area in Kingdom of Saudi Arabia and called the Holy Capital. Contains a population around 2 million. This study was conducted at a tertiary care hospital in Makkah, Saudi Arabia. During the April to June, 2021, participants were a tertiary care hospital in Makkah, and it reflects a diversified demographic profile with a considerable portion of the population comes from rural descent, while others come from an urban one. This difference translates into biological, socioeconomic and lifestyle differences in the Makkah population.

Study Population

The study has been conducted regarding Factors Influencing the Utilization of laboratory services on Public Primary Health Care Services in Makkah al-mokarramah among patients attending both public PHC centres in Makkah City, Saudi Arabia in 2022 During the from May to June 2022 **.**

Selection criteria:
Inclusion criteria

- Clinicians and nursing of the randomly selected primary health care.
- Using laboratory services during the study period were the study population.
- Attending in primary health care center.
- Resident in Makkah province.
- Sound cognitive abilities
- All nationalities
- Both males and females.

Exclusion criteria:

- Clinicians and nurses who did not voluntarily participate were excluded
- Patients with severe cognitive impairment such as dementia or delirium.
- Patients unwilling to give written consent to participate.

Sample size
The sample size has been calculated by applying Raosoft sample size calculator based on (The margin of error: 5%, Confidence level: 95%, and the response distribution was considered to be 20%) accordingly the Sample size is 300 of Saudi Population attending in PHC and adding 10 more to decrease margin of error. After adding 5% oversampling, the minimum calculated sample has been **300.** Computer generated simple random sampling technique was used to select the study participants.

Sampling technique:
Systematic random sampling technique is adopted. After that, by using random number generator, then simple random sampling technique has been applied to select the participant. Also, convenience sampling technique will be utilized to select the participants in the study. By using systematic sampling random as dividing the total clinicians and nurse on work at clinical units by the required sample size; (**300**).

Data collection tool
The study employed a self-administered questionnaire to collect data from patients attending both public PHC centres (or outpatient clinics) in makkah city. The questionnaire was designed to collect data on a number of variables related both to health services users and providers. Descriptive statistics socio-demographic and medical data were used to determine the significant variables which may influence the utilization of this service.

Data collection technique:
Researcher has been visiting the Outpatient Clinics at public PHC centers Makkah City, Saudi Arabia in 2022 after getting the approval from the ministries of health. The researcher has been obtained permission from participants. After the arrival of the participants has been explained the purpose of the study to all participants attending.

Data entry and analysis:
The data were coded and introduced to the Statistical Package of Social Sciences (SPSS, version 24). The data were analyzed to present the findings in descriptive and inferential statistics. The descriptive statistics include frequencies and percentages for categorical variables, while means, median and standard deviations were used to summarize numerical data. The significant associations between demographic and background variables were detected at < 0.05 significance level.

Pilot study:
A pilot study has been conducted in the same sector due to the similarity to the target group using the same questionnaire to test the methodology of the study. As a feedback, the questionnaire has been clear and no defect has been detected in the methodology.

Ethical considerations:
Permission from the Directorate of health, verbal consents from all participants in the questionnaire were obtained. All information was kept confidential, and results will be submitted to the department as feedback. The researcher described the aim and objectives of the study for the residents. No names were required to assure confidentiality of data, and all information was kept confidential only for this study's purposes.
Budget: Self-funded

Table 1 Table 1 Distribution of socio-demographic data in our study in Makkah City, Saudi Arabia. (n-300)

	N	%
Age		
30-40	72	24
40-50	66	22
50-60	105	35

<60	57	19
Gender		
Female	102	34
Male	198	66
Nationality		
Non-Saudi	54	18
Saudi	246	82
Marital state		
Married	201	67
Unmarried	99	33
Employment status		
Employed	162	54
Unemployed	138	46
Monthly income		
Less than 300	84	28
3,000-6,000	99	33
6,001-9,000	102	34
More than 9,000	15	5

Table 1 shows that most of the participants (35.0%) were in the age group 50-60 years follow by the (24.0%) were the age group 30-40 years, the majority of them were males (66.0%) while female(34.0%), also regarding Nationality the majority of participant are Saudi were(82.0%) while Non- Saudi were(18.0%). Regarding the Marital state the majority of participant married were (67.0%). While unmarried were(33.0%), regarding Employment status the majority of participant are Employed were(54.0%) while Unemployed were(46.0%). Regarding the Monthly income the majority of participant from 6,001-9,000 were (34.0%) while from (3,000-6,000)were(33.0%) .

Table 2 Distribution of socio-demographic data Utilization of laboratory services on according to provider-related variables Primary Health Care Services to individual .

	N	%
Registration with PHC		
Yes	255	85
No	45	15
Health status		
Good	99	33
Poor	201	67
Clinical unit		
Maternal	75	25
Chronic	147	49
Outpatient	66	22
Emergency	12	4
Profession category		
Nurse	225	75
Specialist	75	25
Work experience		
Less than 5 years	102	34
5–10 years	66	22
More than 10 years	132	44

Table 2 shows that most of the participants were (85.0%) registration with Primary Health Care follow by the not registration in Primary Health Care were(15.0%), also regarding Health status the majority of participant are poor health stat were(67.0%) while good were(33.0%). Regarding the Clinical unit the majority of participant Chronic were (49.0%). While Maternal were(25.0%), regarding Profession category the majority of participant are nurse were(75.0%) while Specialist

were(25.0%). Regarding the Work experience the majority of participant More than 10 years were (44.0%) while less than 5 years were(34.0%).

Table (3): distribution of the overall satisfaction level with laboratory services according to laboratories performance in our study in primary health care patients.

Satisfaction items	Very/Dissatisfied		Neutral		Very Satisfied		% Of satisfaction	Chi square	
	N	%	N	%	N	%		X^2	P-value
Location of the laboratory in the health facility	105	35	66	22	129	43	69.33	20.220	0.000
Staff in laboratory feeling courtesy and friendliness	39	13	33	11	228	76	87.67	245.940	0.000
Internal organization and procedures	24	8	30	10	246	82	91.33	319.920	0.000
Availability of health information	39	13	63	21	198	66	84.33	146.940	0.000
Working hours	57	19	30	10	213	71	84.00	195.180	0.000
Cleanliness and tidiness of the facility	24	8	39	13	237	79	90.33	282.660	0.000
Reputation of the health facility	63	21	96	32	141	47	75.33	30.660	0.000
Availability of specialized doctors	96	32	135	45	69	23	63.67	22.020	0.000
Waiting time	36	12	96	32	168	56	81.33	87.360	0.000
Availability of ancillary services	102	34	126	42	72	24	63.33	14.640	0.001

Table (3) Shows the overall satisfaction level with laboratory services according to laboratories performance in our study in primary health care patients. Regarding the satisfaction with location of the health facility, were significantly associated with the very satisfied were(43.0%) also % of satisfaction were(69.33%) were P< 0.000 and X^2 (20.220), regarding the satisfaction with Staff in laboratory feeling courtesy and friendliness were significantly associated with the very satisfied were(76.0%) also % % of satisfaction were(87.67%) were P< 0.000and X^2 (245.940), Regarding the satisfaction with Internal organization and procedures were significantly associated with the very satisfied were(82.0%) also % of satisfaction were(91.33%) were P< 0.000 and X^2 (319.920), Regarding the satisfaction with Internal organization and procedures were significantly associated with the very satisfied were(82.0%) also % of satisfaction were(91.33%) were P< 0.000 and X^2 (319.920), regarding the satisfaction with Availability of health information, were significantly associated with the very satisfied were(66.0%) also % of satisfaction were(84.33%) were P< 0.001and X^2 (146.940), regarding the

satisfaction with Working hours were significantly associated with the very satisfied were(71.0%) also % of satisfaction were(84.00%) were P< 0.000 and X^2 (195.180). Regarding the satisfaction with Cleanliness and tidiness of the facility were significantly associated with the very satisfied were(79.0%) also % of satisfaction were(90.33%) were P< 0.000 and X^2 (282.660), regarding the satisfaction with Reputation of the health facility, were significantly associated with the very satisfied were(47.0%) also % of satisfaction were(75.33%) were P< 0.001and X^2 (30.660), regarding the satisfaction with Availability of specialized doctors were significantly associated with the Neutral were(45.0%) also % of satisfaction were(63.67%) were P< 0.000 and X^2 (22.020). Regarding the satisfaction with Waiting time were significantly associated with the very satisfied were(56.0%) also % of satisfaction were(81.33%) were P< 0.000 and X^2 (87.360), regarding the satisfaction with Availability of ancillary services were significantly associated with the Neutral were(42.0%) also % of satisfaction were(63.33%) were P< 0.001 and X^2 (14.640).
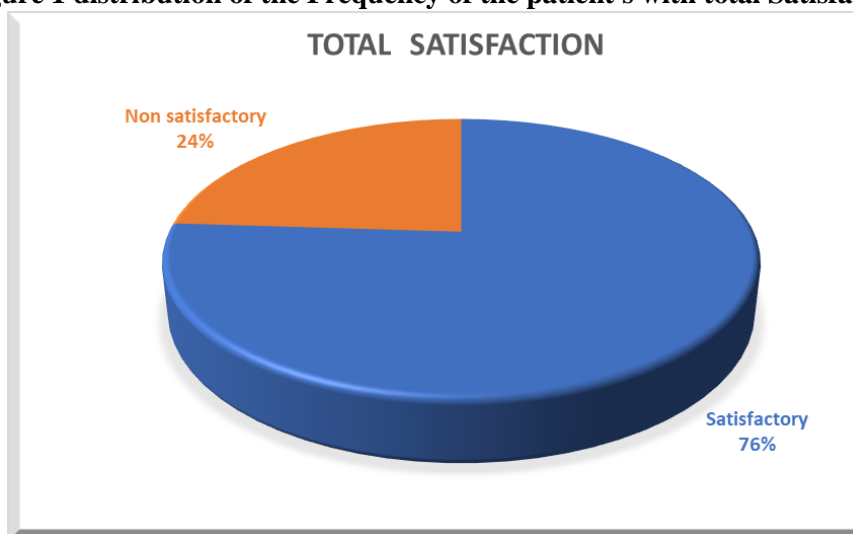
Table 4 Distribution of the Frequency of the patient's with Satisfaction.

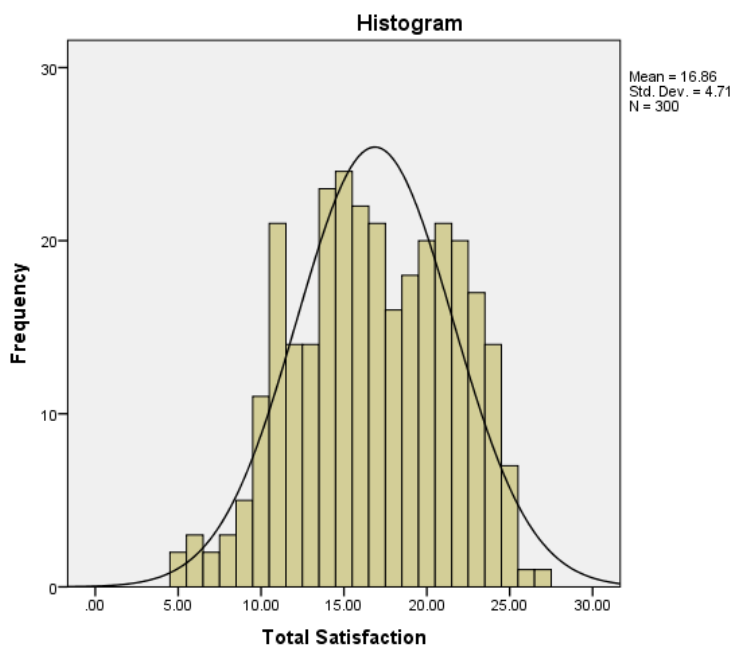|	Total Satisfaction		Chi-square	
	N	**%**	**X^2**	**P-value**
Satisfactory	202	67.33	35.363	<0.001*
Non satisfactory	98	32.67		
Total	300	100.00		
Range	5-27.			
Mean+SD	16.86+4.71			

Table 4 Regarding distribution of the patient's with satisfaction and heave a significant relation between the satisfaction and frequency while P-value <0.001 and X^2 35.363, participant toward Satisfaction study results show the majority of participant had Satisfied were(67.33%) while Non satisfied were(35.67%) but total (100%), while Range were(5-27) while Mean + SD(16.86+4.71)

Figure 1 distribution of the Frequency of the patient's with total Satisfaction

Figure 2 distribution of the Frequency of the patient's with total Satisfaction

Table 5 Distribution of the relationship of the total Satisfaction level with laboratory services in primary health care patients and the demographic data .

		N	Total Satisfaction			F or T	ANOVA or T-test	
			Mean	±	SD		Test value	P-value
Age	**30-40.**	72	12.236	±	2.481	F	233.042	<0.001*
	40-50.	66	13.015	±	2.726			
	50-60.	105	20.276	±	1.596			
	<60	57	20.877	±	3.752			
Gender	**Female**	102	19.500	±	3.092	T	7.589	<0.001*
	Male	198	15.505	±	4.829			
Nationality	**Non-Saudi**	54	22.926	±	1.692	T	13.085	<0.001*
	Saudi	246	15.533	±	4.071			
Marital state	**Married**	201	16.498	±	5.010	T	-1.925	0.055
	Unmarried	99	17.606	±	3.953			
Employment status	**Employed**	162	18.994	±	3.086	T	9.727	<0.001*
	Unemployed	138	14.362	±	5.056			
Monthly income	**Less than 300**	84	21.262	±	1.522	F	128.278	<0.001*
	3,000-6,000	99	18.010	±	3.729			
	6,001-9,000	102	12.725	±	3.624			
	More than 9,000	15	12.800	±	0.414			

Table (5) show that is a significant relation between total satisfaction and demographic data regarding age increase in <60 years were (Mean± SD 20.877±3.752), follow by50-60 age in total satisfaction were (Mean± SD, 20.276 ±1.596) P-value=0.001, F= 233.042. Regarding the gender is a significant relation between total satisfaction and gender increase in Female were (Mean± SD 19.500 ± 3.092), follow male were (Mean± SD, 15.505±4.829) also P-value=0.001, T= 7.589. Regarding the nationality is a significant relation between total satisfaction and Nationality increase in Non-Saudi were (Mean± SD 22.926 ± 1.692), follow Saudi were (Mean± SD, 15.533 ± 4.071) also P-value=0.001, T= 13.085. Regarding the marital state is no significant relation between total satisfaction and marital state increase in Unmarried were (Mean± SD 17.606 ±3.953), follow Married were (Mean± SD, 16.498 ± 5.010) also P-value=0.0055, T= -1.925. Regarding the Employment status is a significant relation between total satisfaction and employment status increase in employed were (Mean± SD 18.994 ± 3.086), follow Unemployed were (Mean± SD, 14.362 ± 5.056) also P-value=0.001, T= 9.727. Regarding the Monthly income is a significant relation between total satisfaction and Monthly income increase in Less than 300were (Mean± SD 21.262±1.522), follow from 3,000-6,000 were (Mean± SD, 18.010±3.729) also P-value=0.001, F= 128.278.

Figure 3 Distribution of the relationship of the total Satisfaction level with laboratory services in primary health care patients and the demographic data
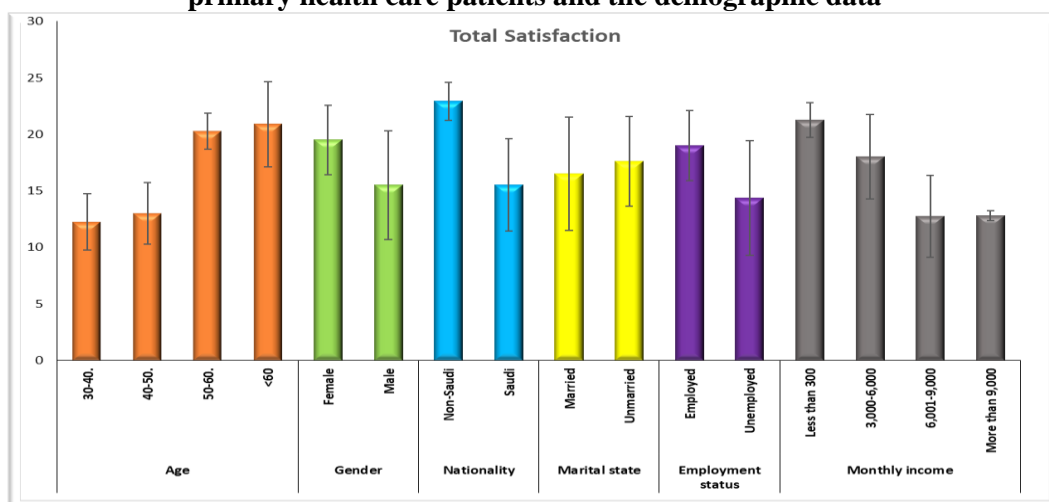
Discussion

PHC is an important health care facility in all areas, but the approach to ignore laboratory in PHC facility may not be appropriate to maximize the PHC performance. total of (300) participated in the study, the researcher selected the participated from Public Primary Health Care center in Makah, the study has been conducted regarding Factors Influencing the Utilization of laboratory services on Public Primary Health Care Services in Makkah al-mokarramah, among patients that attending in the public PHC centres in Makkah City. Makkah city is located in Saudi Arabia. One of the most important characteristics of Makkah is its location, which is characterized by proximity to Makkah. In our study showed that the most of the participants were (85.0%) registration with Primary Health Care follow by the not registration in Primary Health Care were(15.0%), also regarding Health status the majority of participant are poor health stat were(67.0%) while good were(33.0%(. Regarding the Clinical unit the majority of participants Chronic were (49.0%). While Maternal were(25.0%), regarding Profession category the majority of participant are nurse were(75.0%) while Specialist were(25.0%). Regarding the Work experience the majority of participant More than 10 years were (44.0%) while less than 5 years were(34.0%) .(see table 1).In similar study the Rusanganwa et al (2020) found The level of laboratory service in PHC and number of OPD visits per day is positive, the strong positive correlation was obtained between laboratory service-related parameters and overall hospital performance (composite of patient results, staff and work system result, hospital efficiency and effectiveness result and flexibility performance) for Jordanian Hospitals' [22].

In laboratory service, customers' perspective, including the clinicians' and nurses ones, has increasingly become an important tool to identify opportunities for quality improvement.

Regarding the overall satisfaction level with laboratory services according to laboratories performance in our study in primary health care patients . Shows the overall satisfaction level with laboratory services according to laboratories performance in our study in primary health care patients . Regarding the satisfaction with location of the health facility, were significantly associated with the very satisfied were(43.0%) also % of satisfaction were(69.33%) were P< 0.000 and X^2 (20.220), regarding the satisfaction with Staff in laboratory feeling courtesy and friendliness were significantly associated with the very satisfied were(76.0%) also % % of satisfaction were(87.67%) were P< 0.000and X^2 (245.940), Regarding the satisfaction with Internal organization and procedures were significantly associated with the very satisfied were(82.0%) also % of satisfaction were(91.33%) were P< 0.000 and X^2 (319.920), Regarding the satisfaction with Internal organization and procedures were significantly associated with the very satisfied were(82.0%) also % of satisfaction were(91.33%) were P< 0.000 and X^2 (319.920) **(Table 3)**

in our study the assessment overall satisfaction level with laboratory services according to laboratories performance in primary health care patients, assessed clinicians' and nurses satisfaction with laboratories and associated factors at primary public health centres in Saudi Arabia. Overall, distribution of the patient's with satisfaction and heave a significant relation between the satisfaction and frequency while P-value <0.001 and X2 35.363, participant toward Satisfaction study results show the majority of participant had Satisfied were(67.33%) while Non satisfied were(35.67%) but total (100%), while Range were(5-27) while Mean + SD(16.86+4.71)(See Table 3, 4)

Almatrafi. et al (2018) the finding appeared higher than studies conducted in southern Ethiopia (52.9%), public hospitals of Ethiopia (55.0%).[25]. Addis Ababa and Nekemte, Ethiopia (51.3%- 62.8%) [15], and a maternity hospital in Saudi Arabia (2.7) [28] . However, those studies covered only hospitals, not primary health centres, or only physicians, not all clinicians. On the other hand, the finding is lower than the findings of the Q-Probes studies performed in the USA (4.1–4.2) [29]. The discrepancy with these studies reflects the better service quality and user experiences in such resource-rich settings with more advanced diagnostic facilities.

Regarding the relationship of the total Satisfaction level with laboratory services in primary health care patients and the demographic data . The study on US hospitals showed that clinical technology inclusive of laboratory technology drives the hospital clinical quality and financial performance [35]. However, the level of laboratory service in PHC was not found to be a significant predictor of overall PHC performance in multivariate analysis, which was unexpected. that some precautions are needed in interpreting the absolute effect of The level of laboratory service [33] in PHC on PHC performance. These findings suggest that The level of laboratory service in PHC could be a strong trigger to improve the PHC performance, but alone it is not an enough condition to improve the PHC performance. In the Indian context, patient could

access public laboratory facility only on referral from medical doctor [30] (See Figure 3)

Conclusion

The study concludes that laboratory services could play an important role in maximizing the PHC performance. Higher level laboratory service in PHC could help in getting more visits in the OPD. The training of existing laboratory techniques could be a cost-effective approach in resource-constrained settings to maximize the returns from the existing medical workforce in PHCs. Finally, study found that PHCs with lower population coverage could benefit from higher level laboratory service as compared to other PHCs in enhancing their performance in terms of number of OPD visits per day.

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