

The effect of Yemen civil war on eye services

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Abstract

Background: Yemen's civil war has led to deterioration of eye care services over a short period of time. The aim of this study is to determine and classify the factors which have affected the eye care services in Yemen during the current civil war. **Methods:** This prospective qualitative study has interviewed 307 patients and 23 eye-care providers from three major hospitals in three governorates: Aljabali Eye Hospital (Ibb), Alahdal Eye Hospital (Taiz) and Magrabi Eye Hospital (Sana'a) in the period from 08 March to 28 April 2019. The data collected was analyzed by using thematic analysis, ANOVA one way method. Significance difference was assessed between groups at 5% level of significance, Sig (2-tailed), t test and correlation between the factors affected both groups by hospitals was carried out. **Results:** A total of 307 patients were enrolled in this study. 88.9% of the patients were affected in receiving adequate eye-care services. The most common factor affected the patients was financial issues (39%), safety issues (29%), consequences on services (20%) and migration issues (12%). While the factors that affected the eye-care providers were economy issues (27.2%), medical supply issues (25.9%), the siege and direct impact issues (19.7%), machine maintenance /damage (16.5%) and psychological effect (9.9%). **Conclusion:** Financial and economic crisis were the most common factors reported by both groups which led to the deterioration of eye-care services. Consequences on medical-care services and its supply were mentioned by both groups as a result of the siege over the country. Safety problems had an impact on patients receiving an adequate eye-care. Most of the eye doctors have reported that war affected their continuing medical education (CME) as all embassies and most of the airports are closed.

Key Words: Eye-care providers; Eye services; Patients; Yemen Conflict.

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INTRODUCTION

The Republic of Yemen is located in the south west part of Arab peninsula with an area of 555,000 Km². Yemen population is around 28 Million distributed in 21 governorates in addition to the capital city of Sana'a¹.

Around 69% of the population lives in rural areas². Yemen is one of the poorest countries in the Middle East and is ranked as the 160th country based on the human development index³. An estimated 35% of the population is living below the poverty line in 2015³. Since 2011, Yemen continued suffering from political instability, disrupted socio-economic and livelihood chances. Continued insecurity and fighting between different parties have affected the overall economic development. The airstrikes and conflicts damaged the essential infrastructure including markets, roads, bridges, hospitals, schools, residential houses, power stations, plants, shops and water lines. The conflict has also caused in breakdown of trade and markets in many of the active conflict areas such as Taiz. As a result, many people lost their physical and economic access to food and other basic needs. Yemen civil war has begun in 2015 between two factions: the

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Yemeni government and the Huthi armed militia, along with their allies and supporters. Both claim to constitute the official government of the Republic of Yemen⁴. The war had a devastating impact on every sector in Yemen including agriculture, industry and service, which faced large-scale destruction and cost increases and the health system has been disrupted^{5,6}. After more than four years of conflict, Yemen faces the world's largest humanitarian crisis with over 24.1 million people (i.e. 80% of the country's population)⁷, in need of immediate humanitarian assistance, including 14 million people in acute need⁸. For millions of Yemenis the impact of the conflict is compounded by severe food insecurity [9] and the world's largest single-year cholera outbreak¹⁰. Yemen's health sector is one of the most fragile sectors and this fragility has worsened due to direct damages to the health facilities. The initial reconstruction costs in the health sector are estimated at \$2.66 billion¹¹. As an example of the damages, about 27% of approximately 301 health facilities in Sana'a, Aden, Taiz and Zinjibar cities had been damaged at the end of 2015¹². The destruction, accompanied by absence of electricity; lack of medicine and medical supplies; lack of operating expenses and non-payment of monthly salaries for health workers, has severely affected the continuity of health services¹³. Findings of the Health Services and Resources Availability Mapping System, carried out in 16 out of Yemen's 22 governorates, during March-June 2016 and published in October 2016, indicate that the health system operates at less than a half of its capacity⁹. About 50% of hospitals and health facilities in Yemen continue to be out of service or functioning partially. Health-care remains inaccessible, with many civilians having to travel long and often dangerous route, to access a basic care. From October 2018 to January 2019, Physicians for Human Rights PHR verified six attacks on medical facilities¹⁴.

The current war has devastated Yemen, affecting health-care services in general. This high intensity conflict has led to the deterioration of eye care services functionality over a short period of time. According to World Health Organization (WHO), "An estimated 14.8 million lack access to health care services"¹⁵. Major hospitals and health centers are not able to provide the required minimum services. According to the International Committee of Red Cross, "Yemen is the world's single largest humanitarian crisis with over 20 million in need of aid"¹⁶ and also "less than 45% of the hospitals work and the health professionals are not able to cope with the needs"¹⁷. Information regarding the factors which led to the deterioration of the eye-care services has not been explored or searched at the current civil war and also it has not been looked for at the previous conflicts in Yemen over the past few decades. This study aimed to determine and

classify the factors which have affected eye-care services during the current civil war in Yemen.

METHODS

This is a qualitative prospective study was accomplished by interviewing two groups by a questionnaire, 307 patients and 23 eye-care providers in the period from 04th of March to 28th of April 2019. The study was done in three governorates; Ibb which is situated at the inland south of Yemen, Taiz which is located at the south-western part of Yemen, and Sana'a (the capital of Yemen) which is situated at the north-western part of Yemen. Patients' data were collected from three major hospitals in three different governorates (Aljabali Eye Hospital in Ibb, Alahdal Eye Hospital in Taiz and Magrabi Eye Hospital in Sana'a) by trained health staff. Aljabali Eye Hospital is located in Ibb city and is under control of the Huthi Militia. Alahdal Eye Hospital is located in the city of Taiz and is under the control of the Yemeni Government. Magrabi Eye Hospital is located in Sana'a city and is under control of the Huthi Militia. The questionnaire administered for the patients included information on patient's age, gender, demographic data and questions about the factors which have affected them in receiving adequate eye-care services during the current civil war in Yemen. The questionnaire was open-ended and close-ended type of questions. After taking permission from each respective hospital, data was collected during patients' waiting time for their out-patient clinic appointment by trained health staff. The interview has taken approximately 15 minutes for each participant. Patient permission was taken and the purpose of the questionnaire was explained. After taking their preliminary data, a close ended question was asked "did the current civil war affected you in receiving an adequate eye care services" Yes/No and then followed by an open-ended question "If yes, what were the factors and issues that affected you in receiving adequate eye care services during the current civil war?". For the qualitative analysis, a grounded data driven approach was used which was not organized according to a prior theoretical assumptions but based on structures that emerged from the data. After conducting all individual interviews, the initial impressions was noted and observed to develop a preliminary understanding of some basic patterns of both homogeneity and heterogeneity of the participants experiences which has been given in the materials. Parts of the transcribed materials were sorted out that were relevant for the research question. The edited parts from transcribed material have been read to obtain a basic sense of the participants' experiences¹⁸. Then keywords and concepts were developed and attached to a text segment in order to permit its later retrieval¹⁹. The concepts or keywords have reflected interpretation of the theme. The meaning within those concepts was summarized into themes reflecting the

most important aspects of the participants' experiences. This process gave a list of themes and a view what were the factors that affected the patients in receiving adequate eye care services during current civil war in Yemen for example, concepts such as poor income, increased treatment cost, increased transportation cost, cease of salaries or deterioration of the economy and these concepts were summarized under a single theme 'financial issues'. These concepts, themes and participants preliminary data entered into an Excel sheet and analyzed by Statistical Package for the Social Science (SPSS) version 21.0, ANOVA one way method (Fisher exact test), Significance difference was assessed between within groups at 5% level of significance by using Duncan multiple test, Sig (2-tailed), t test and correlation between the factors affected both groups by hospitals was carried out by Pearson correlation test. The second groups of participants were the eye-care providers which included the ophthalmologists, optometrists and managers of eye hospitals. Data was collected from eye care providers from various hospitals in different governorates by face to face interview and social communication. The questionnaire aimed at addressing the factors affected them in providing proper eye care services from the perspective of each personnel during the current civil war. The questionnaire was of an open-ended type of questions. The questionnaire administered for the eye-care provider includes information on participant age, gender, demographic data and questions about the factors which have affected them in providing adequate eye care services during the current civil war. After taking their permission and explaining the purpose of the questionnaire, their preliminary data was taken and an open ended question was asked to the ophthalmologists and optometrist "how the current civil war has affected eye care services from your perspective?", what were the factors affecting it?", then followed by "did the current civil war has a direct impact on you providing a proper eye-care services and how?". While the eye hospital managers, an open-ended question was asked "how the current civil war affected eye care services from management perspective and what were the factors affecting it?" The analysis was conducted similar as the patients' data analysis where it was a grounded driven approach. The initial impressions from the transcripts were noted to understand the basic patterns of their experiences. The keywords and concepts were developed and attached to a text segment for easy retrieval. Themes were summarized from these concepts reflecting their experiences and factors affected eye care services from each personnel perspective for example, concepts such as medicinal and equipment's' entry issues, airports closure, embassies closure, difficulty to attend conferences and training, and these concepts were summarized into a single theme 'siege related issues'. The data were analyzed

by SPSS version 21.0. Statistical methods used were ANOVA one way method (Fisher exact test), Significance difference was assessed between within groups at 5% level of significance by using Duncan multiple test, Sig (2-tailed), t test and correlation between the factors affected both groups by hospitals was carried out by Pearson correlation test.

RESULTS

A total of 307 patients were enrolled in this study. The number of males (195) outnumbered the females (111) with a percentage of (64% and 36%) respectively, as illustrated in Table 1. Age group (35-49) had the highest percentage with 45% than other age groups as illustrated in Table 1. The distribution of patient by hospitals and governorates during the period of study is illustrated in Table 2. The high number of samples appeared from Taiz governorate (41.4% of total sample), and they were distributed in the three hospitals Alahdal, Aljabali and Magrabi 69, 46 and 12 respectively. Ibb governorate came in the second order in patient number, with the rates of 29.0% of total, most of them were treated in Aljabali hospital and 11.23% of them treated in Magrabi hospital and only 3.37% of them were treated in Alahdal hospital. Sana's governorate was having the third highest in patients' number with 10.74%. Other governorates are shown in Table 2. The amount of the patients those benefited from healthcare services in Aljabali Hospital that placed in Ibb city in the middle of Yemen was the highest which represented 46.25% of sum number of samples. The majority of them were from Ibb followed by Taiz, Alhodayda, Aldhalea and Dhamar respectively. And the quantity of peoples those obtained the healthcare services in Magrabi Hospital that placed in Sana'a city (the first capital of Yemen) came in the next order after that of Aljabali Hospital, this form a percentage of 30.29% from all patients' number in the study, they are from the most of different governorates of Yemen. While the quantity of the peoples those subjected to treatment of eye disease in Alahdal Hospital that positioned in Taiz city was decreased significantly in comparing with that of Aljabali Hospital, the ratio was 23.45% of total of people with eye disease who participated in this study, all of them were from Taiz itself and only three person from Ibb, but they are living in Taiz predominantly. Statistically the results showed high significant differences between Aljabali Hospital and both of Magrabi and Alahdal Hospitals at the $P \leq 0.05$ level. 88.9% of the total patients enrolled in this study were affected in receiving an adequate eye care services in the current civil war in Yemen, while 11.1% of the patients responded that were not affected. Factors that affected patients in receiving a proper eye care services were summarized from patients' responses into general themes

which developed from keywords/concepts. Those factors were safety issues such as patients expressed their problems with security issues due to the on-going conflict which reflected their incapability to get the required and needed eye care services. Categories that came under the safety issues were fear and insecurity where participants narrated their experiences with fear of going out sometimes especially when the conflict between fighting parties get very intense which makes it very difficult to get the basic life demand and medical care needed. Some participants revealed that at some point in this war, we were not able to go out from our house as the conflict gets intense in our area and not only getting the needed eye or any medical care services becomes difficult, even basic life needs. Some patients indicated the difficulty to travel to the required eye care centers, especially when most of the populations are living in the rural areas where the basic needed eye care services are absent. As the present conflict, many roads would be blocked and there are high numbers of checkpoints. One patient stated that I had to travel 4 hours to this hospital from my area which would take 1 hour in normal days and that is due to the blockage of the main road by the fighting parties. Patients indicated their financial challenges to offer the required treatment as a result of the economy crisis of the country during the four years of civil war. Categories under financial issues are poor income and patients revealed that job chances and availability has become less due to current civil war so the income for many people has deteriorated during this period which they are not able to afford treatment. One patient stated that I used to work as a guard in a private company but when the civil war started, the administration had to let go of some of the staff. It is difficult to find a job nowadays and get money to afford the costly treatment and basic supply. Patients expressed their experiences with the high cost of transportation during war, especially when they have to go far distances to get the needed eye care services. The fuel cost has increased in cost four times during war which made the high transportation cost, sometimes is higher than cost of treatment required. Patients revealed that the care services, like surgeries and medicines have increased in cost during war which it has become difficult to afford for many families. Many cannot afford the treatment without charitable or philanthropic organizations support that is currently present in Yemen. Patients indicated that the economy crisis during the current conflict has a major impact affecting care services and in every sector in the country. As the currency rate goes up, the cost of everything including health and eye care services would get difficult to afford by many patients. Participants expressed that as the conflict started four years back, most governmental employees stopped getting their monthly salary which added to their suffering and it is one

of the main reasons that affected them receiving the needed eye care services. Participants indicated that one of the factors that impacted on the eye care services is the migration of ophthalmologists and as well as the eye centers because of the intense conflict in the country. Participants revealed that they have to travel long distances in certain areas especially when their local eye centers and ophthalmologists have migrated locally or abroad after the start of the civil war for a better working environment, also the clinical waiting time has increased due to this reason. Also, participants indicated the overcrowded clinics are an issue during this war which is a reflection of the manpower deficiency. Participants revealed their experiences with not finding required medicines and certain eye services that used to get before the current civil war started, also the entry of unoriginal, substandard and unregistered drugs to the country during the civil war period. My relative is in need of corneal transplantation but we have been told he needs to travel abroad to do it as it is not available anymore in the country, one patient commented to the situation of eye health services in Yemen. Figure 1 shows that financial issues (39%) were the most common factor to affect the patients receiving adequate eye care during this civil war. 29% of patients had safety issues, 20% of them reporting the consequences on medical services and 12% was due to the migration issues. Factors distribution by hospitals was analyzed. Different factors were noted as most common by each hospital. Financial issues was the most common factor by participants interviewed at Aljabali hospital with (54%), Migration issues was the most common factor by participants interviewed at Alahdal eye hospital with (39%) and Consequences on services was the most common factor by participants interviewed at Magrabi eye hospital with (35%) as shown in Figure 2. Table 3 shows the Correlations between factor that affected the health care service according to patients responses, the results showed that the financial factors related negatively with displacement and siege with high significant difference at the 0.05 level (2-tailed) according to Pearson Correlation test. The correlation between financial factors and both of consequences on services and those factors of safety issues was negative but with no significant difference. The correlation between consequences on services factors and both of Migration issues and safety factors was negative with high significant difference 0.05 level (2-tailed) and the 0.01 level according to Pearson Correlation test for both respectively. No correlation appeared between migration issues and safety issues. Significant difference at $p \leq 0.05$ was noted on some factors distribution by governorates, Safety issue, Migration issues and consequences on services. Migration issues were noted as the most common factor by participants from Taiz city as there is a siege over the city and a very intense conflict

which made most of centers and doctors to migrate to a safer place. A total of 23 eye care providers (ophthalmologists, optometrists and eye hospitals managers) were enrolled in this study. Factors affected eye care providers in providing an adequate eye care services were summarized from their responses into general themes which developed from categories/concepts. Those factors were the following:

Participants expressed their problems with economy deterioration which affected the eye care services at different levels. Participants revealed that increased the currency value has affected the prices and reduced the revenue and profit of all hospitals and eye doctors as well. They indicated the consequences of economy not only affected them as an eye care providers but the patients as well. The categories summarized under the economy issues were eye care providers revealed that the current war has affected the value of the Yemeni Riyal currency which has lost by 300% which reflected on services cost, difficulty in affording medical supplies and equipment as it has to be purchased in Dollar currency and revenue of hospitals and doctors has been affected during current civil war. Eye-care providers indicated that when the civil war started the living expenses got higher every day and their salaries are keeping with life demand especially for many who receive their salaries in local currency. The increased fuel cost has also added to the expenses of hospitals as the need of diesel for local generators since electricity supply has disappeared during this civil war. Problems with medicinal availability in the market and the difficulty to find especially during the start of the civil war. They revealed the issues with difficult entry of medical supply and equipment to the country during the going conflict. There was acute shortage of Eye drops in the beginning of this war and disappeared from the pharmacies and drug stores and patients found difficulty in procuring common medications and eye drops. They expressed that eye drops which they used to get during the first two years of war, mostly were smuggled and majorities were of substandard quality. Medical equipment are very difficult to come to Yemen easily in comparison with the pre-war times and this led to use old and second hand instruments and this led to dangerous consequences, especially if used for surgical or investigational purposes. The new technology of fem to

second cataract and refractive surgery is becoming routine all over the world and the plan was to start this service in Yemen but this ugly war stopped this new technology from coming to Yemen because no-one dares to invest in these situations. Maintaining the medical equipment and machines became difficult as engineering personnel either migrated abroad or are not able to come to Yemen due to the intense conflict within in the country. Eye care providers expressed their problems with difficulty to attend conferences abroad or training as all embassies have closed in the country and most of airports were forced to shut down. They also indicated that some of the eye centers have closed either due to a direct hit by airstrike or the high intense conflict in the locality. Incidence of ocular injuries during the current civil has increased, either injuries sustained by people who involved in the fight or innocent people as collateral damage. Certain eyes services have stopped as a result of the civil war in Yemen, like corneal transplantation services as a result of corneas embargo to Yemen. Eye doctors expressed that the current civil war have affected them psychologically with all the pressure and issues which are going on since the war started. The economy issues was the most common factor with (27.2%), then medical supply issues was next on the list with (25.9%), (19.7%) due to the siege and Direct impact issues, (16.5%) due to machine maintenance/damage and finally the psychological effect on doctors with (9.9%) as illustrated in Figure 3. Table 4 illustrate the correlations between factors doctors as recorded by doctors in this study, the results indicated that the relation between Medical supply issues factor and both of machine maintenance/ damage and economy issues is positive it was higher with economy issues than that of Medical supply issues factors with no significant difference, while machine maintenance/ damage factors related to the siege factors negatively. The factors that concerned with machine maintenance/ damage showed high positive relation with that of financial factors and negative correlation with that of siege factors but no significant difference statistically. Siege factors didn't reveal any correlation with economy issues and psychological factors. Similarly, psychological factors didn't reveal any correlation with any factors.

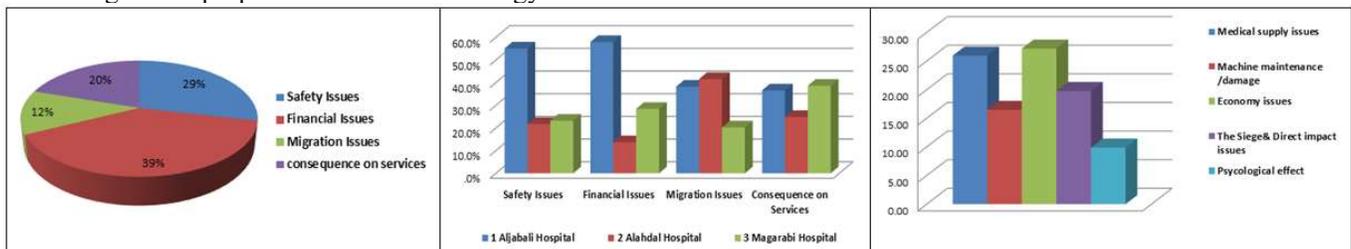


Figure 1: Factors affecting eye care services (Patients' Group) **Figure 2:** Distribution of factors by hospitals **Figure 3:** Factors affected eye care services (Eye Care Providers' Group)

Table 1: Age and Sex distribution of Patients

Age groups	Female		Male		Total	
	N	%	N	%	N	%
18-34	27	9	54	18	81	26
35-49	52	17	85	28	138	45
50-64	29	9	50	16	79	26
>65	3	1	6	2	9	3
Total	111	36	195	64	397	100

Table 2: Distribution of patients by hospitals and governorates

Governorates	Hospitals				Total	%
	Aljabali*	Alahdal	Magrabi	Total		
Albayda'a	0	0	6	6	6	2.0
Aldhalea	4	0	1	5	5	1.6
Alhudeidah	10	0	8	18	18	5.9
Aljawf	0	0	1	1	1	0.3
Almahara	0	0	1	1	1	0.3
Almahwit	0	0	3	3	3	1.0
Amran	0	0	3	3	3	1.0
Dhamar	3	0	5	8	8	2.6
Hadramout	0	0	1	1	1	0.3
Hajja	0	0	4	4	4	1.3
Ibb	78	3	10	91	91	29.6
Lahj	0	0	1	1	1	0.3
Raymah	1	0	1	2	2	0.7
Sadaa	0	0	2	2	2	0.7
Sana'a	0	0	33	33	33	10.7
Shabwa	0	0	1	1	1	0.3
Taiz	46	69	12	127	127	41.4
Total	142	72	93	307	307	100

*The mean difference is significant at the 0.05 level from other groups

Table 3: Correlation of factors by patients

		Financial issues	Consequences on services	Migration issues	Safety issues
Financial issues	Pearson Correlation	1	-.085-	-.118-*	-.069-
	Sig. (2-tailed)		.137	.039	.228
	Sum of Squares and Cross-products	240.423	-14.609-	-15.622-	-13.166-
	Covariance	.786	-.048-	-.051-	-.043-
N		307	307	307	307
Consequences on services	Pearson Correlation	-.085-	1	-.127-*	-.182-**
	Sig. (2-tailed)	.137		.026	.001
	Sum of Squares and Cross-products	-14.609-	122.515	-12.036-	-24.769-
	Covariance	-.048-	.400	-.039-	-.081-
N		307	307	307	307
Migration issues	Pearson Correlation	-.118-*	-.127-*	1	.000
	Sig. (2-tailed)	.039	.026		.999
	Sum of Squares and Cross-products	-15.622-	-12.036-	73.199	-.010-
	Covariance	-.051-	-.039-	.239	.000
N		307	307	307	307
Safety issues	Pearson Correlation	-.069-	-.182-**	.000	1
	Sig. (2-tailed)	.228	.001	.999	
	Sum of Squares and Cross-products	-13.166-	-24.769-	-.010-	151.427
	Covariance	-.043-	-.081-	.000	.495
N		307	307	307	307

* Correlation is significant at the 0.05 level (2-tailed).

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

Table 4: Correlations of factors by Eye care providers

		Medical supply issues	Machine maintenance/ damage	The siege and direct impact issues	Economy issues	Psychological effect
Medical supply issue	Pearson Correlation	1	.166	-.162-	.203	.a
	Sig. (2-tailed)		.448	.461	.353	.
	Sum of Squares and Cross-products	21.826	2.870	-4.000-	2.957	.
	Covariance	.992	.130	-.182-	.134	.
	N	23	23	23	23	0
Machine maintenance/ damage	Pearson Correlation	.166	1	-.102-	.279	.a
	Sig. (2-tailed)	.448		.642	.197	.
	Sum of Squares and Cross-products	2.870	13.652	-2.000-	3.217	.
	Covariance	.130	.621	-.091-	.146	.
	N	23	23	23	23	0
The siege and direct impact issues	Pearson Correlation	-.162-	-.102-	1	.000	.a
	Sig. (2-tailed)	.461	.642		1.000	.
	Sum of Squares and Cross-products	-4.000-	-2.000-	28.000	.000	.
	Covariance	-.182-	-.091-	1.273	.000	.
	N	23	23	23	23	0
Economy issues	Pearson Correlation	.203	.279	.000	1	.a
	Sig. (2-tailed)	.353	.197	1.000		.
	Sum of Squares and Cross-products	2.957	3.217	.000	9.739	.
	Covariance	.134	.146	.000	.443	.
	N	23	23	23	23	0
Psychological effect	Pearson Correlation	.a	.a	.a	.a	.a
	Sig. (2-tailed)	.	.	.	.	.
	Sum of Squares and Cross-products	.	.	.	.	.
	Covariance	.	.	.	.	.
	N	0	0	0	0	0

a. Cannot be computed because at least one of the variables is constant.

DISCUSSION

The civil war in Yemen since it started on 26th of March 2015 has devastated the health care services in general including the eye care services which it has been caused by various factors and issues during this current war. These factors were looked for from two perspectives, the patients' perspective of factors and issues affected them in receiving adequate eye care services and the eye care providers' perspective of factors affected them in providing the needed eye care services during current civil war in Yemen. The common factor which has affected the patients receiving adequate eye care services was financial issues (39%), other factors were safety issues (29%), consequences on medical services (20%) and migration issues (12%). The financial issues were the most common reason to affect the patients to receive the needed eye services during this war. The average income in Yemen is very low and it is one of the lowest in the Eastern

Mediterranean Region Countries which it got worse during the current conflict^{20, 21}. Most people and governmental employees stopped getting their monthly salary during this war²². The financial status of Yemeni people is already poor before the war and as the war started the situation became a bad financial crisis in Yemen. The economy crisis in the country was unavoidable side effects of the war which has increased the cost of medical services and basic life needs. The Yemeni Riyal is exchanging at 630 to the US Dollar and was 205 in the beginning of the war²³ with an increase of almost 300%. Some of the patients expressed their inability to get the eye care services without the aid of charitable organizations. Fuel has become difficult to find since the war started and black market emerged and became the main source of petrol with huge increase in its cost which made the transportation cost very high between governorates and cities. Safety issues were reported by the patients in the study group with (29%)

which affected their acquiring eye care services. Since the war has started the security check-points have increased which made the transportation difficult, in addition many of the roads and bridges between cities have been destroyed by air-strike which made it harder to commute for patients²². Patients might face land mines or snipers en route on their way to health care services in most conflicted cities²⁴. Patients became afraid to go out for visiting the eye care services due to insecurity reasons from the intense conflicts at certain areas in different cities. As a result of the blocked roads due to conflict, patients needed to take alternative difficult roads and the period travel would take up to three times of the normal route should take and they would not feel safe at all during this long commute between major cities. Since the collapse of Yemen's public health system and its economy, people have difficulty in accessing medical care. They often are not able to afford transportation to the few remaining hospitals in the country²⁵. Consequences on medical services factor was reported by the patients with (20%). Certain eye drops and drugs have become unavailable during the current war especially when most of airports and sea ports are closed. Restrictions of medical supplies entry by the fighting parties has contributed to health care system collapse²⁶. Patients also reported that certain eye care services are not available anymore in the country as a result of war like corneal transplantation, as corneal grafts were imported from US before the current civil war and the eye bank refused to export to Yemen. Migration issues were reported as a factor affecting the eye care services during this war with (12%). The high intensity conflicts made some of the eye centres to shutdown at certain areas and migrate to safer places which affected many patients to get the required services in such areas. More than half of the medical facilities in Yemen have closed and many others lack in medical personnel. Only 45% out of 3,507 health facilities were still functioning at their full capacity, while 38% were functioning partially, and the rest 17% had stopped operating completely⁹. Some of the local and foreign eye doctors in Yemen have left the country due to the insecurity and to work in a better environment²⁷. The migration of eye doctors has affected the eye services which it has increased the work pressure on the present doctors which led to overcrowded clinics with long waiting time. Migration issues was noted as the most common reason from patients who were living in Taiz city as there is a siege over the city and a very intense conflict which made most of the centers and doctors to leave the city and many hospitals were hit and damaged²⁸. In Taiz governorate, more than 8,000 people have fled and 22,000 people are affected by intense fight²⁵. WHO has deployed a rapid response team to districts receiving internally displaced persons to identify the most urgent health

needs²⁵. The most common factor that affected the eye care providers was the economy issues (27.2%); other factors were medical supply issues (25.9%), the siege and direct impact issues (19.7%), machine maintenance/damage (16.5%) and psychological effect (9.9%). Economy crisis in this war led to a catastrophic humanitarian crisis and affected almost everyone in this country including the doctors. Yemen's economy had contracted 50% since the war started and the poverty line rose 32% since 4 years. Yemen is the most impoverished nation in the Arab world²⁹. The Yemeni Riyal lost its value and eye care providers would import the medical supplies in US Dollar currency and that leads to revenue and profit loss. Majority of eye doctors receive their salaries in local currency and that has affected their financial status, living expenses for their families or even to be able to pay for training abroad or attend international conferences. The medical health workers in governmental sector stopped receiving their monthly salaries with estimated 52,723 of them did not get their salaries for many months¹³. As it has mentioned above the black market for fuel has emerged since the start of this civil war and it has increased four times in its cost. Almost all hospitals in the country use local generators for electricity since the government electricity disappeared from the start of this war. High fuel cost added the extra expenses which is already high. The electric power system has been destroyed since the civil war has started and fuel is accounted for 70% of electricity generation in Yemen in 2010³⁰. Yemen is the least electrified country in the Middle East and North Africa region. Nearly 80% of the people without electricity in the Middle East live in Yemen¹². The situation has worsened due to the direct physical damages to the power sector, estimated at about \$ 765 million by 2017⁸. The civil war led to the closure of most airports and Port Sea and that affected the entry of medical supplies to the country. Sometimes the medical supplies and food would be blocked for few weeks during this war which it has been reported by international health organization³¹. There is a severe shortage of medical supplies and the health system is largely dependent on what WHO and other humanitarian partners would bring to the country, but even these supplies will not cover the gaps³². Eye care providers are not able to provide the full and adequate eye services as long as the necessary equipment and supplies are not provided to them and ultimately patients would have to travel abroad for certain unavailable eye services, like corneal transplantation which have been mentioned by the eye care providers. The difficult entry of medical equipment would cause the use of the old and second hand instruments for surgeries and investigational purposes which is dangerous for the patients.

The foreign embassies in Yemen have closed when the civil war started four years ago³³. It has caused the cease of all types of cooperation which reflected on eye care services as the expertise surgeon cannot visit Yemen to perform complicated surgeries. Closure of most airports and embassies made it difficult for eye doctors to continue their medical education by attending conferences and training courses abroad. Eye care providers reported incidences of indirect hit of hospitals by airstrike which led to closure of these centres. Many hospitals have been hit in different districts during the current civil war³⁴. In 2015, it has been reported that many health centres have sustained damage, more precisely 36% of public, private and teaching hospitals, 16% of health centers and 21 health units and offices¹¹. The civil war prevented the foreign professionals to be able to visit Yemen like the Medical engineers that led to the poor maintenance of important medical equipment and machine which is reflecting on poor services to the patients. There is a psychological effect on people as the result of this civil war which it has reached the eye doctors as few of them have reported. This is a dangerous phenomenon that it has to be looked for and treated as health professionals should be mentally fit for treating and taking care of patients. The recommendations that we would suggest for improving the care system would be: Peace is very much needed now where the functions of the eye and health care system would be restored. The salaries of eye care providers have to be paid and the salary scale should be reviewed and improved to ensure a dignified standard of living for the eye care providers. Health stakeholders should strengthen their coordination with district health offices and governorates for financial management and ensuring smooth health operations until the resolution of war. International organizations and their humanitarian consideration in Yemen should ensure the engagement and participation of the private health sector to expand the coverage of health services. Yemeni constitution has stated that health is a right for all Yemenis and the guarantee access to free health care. The poor Yemeni people should be financially protected against the health care cost and that can be done by establishing the national health insurance by the Ministry of Public Health.

Limitations

This study may be limited by using of a questionnaire as a data collection instrument. Due to questionnaires must generally be brief, it might not all factors have explored as few questions have been included in the questionnaire. It might also be affected by the use of convenience sampling method. The sample of patients and eye care providers may not be representative of the total population, so care to be taken when generalizing these findings to the entire population. All attempts were made to minimize the effects

of these limitations on this study of Yemen's civil war affecting the eye care services.

CONCLUSION

Financial and economic crisis were the most common factor reported by both groups (Patients and Eye Care Providers) which led to the deterioration of eye care services. Consequences on medical care services and its supply were mentioned by both groups as a result of the siege over the country. Safety problems had an impact on patients receiving an adequate care services as it is difficult to commute between areas and cities. Most of the eye doctors have reported that war affected their Continuing Medical Education (CME) as all embassies and most of the airports are closed and it has prevented surgeon expertise and medical engineer to come and visit Yemen for improving the eye care services.

REFERENCES

1. Demographics of Yemen [Internet]. En.wikipedia.org. 2019. Available from: https://en.wikipedia.org/wiki/Demographics_of_Yemen.
2. Yemen Urban Population [Internet]. Tradingeconomics.com. 2019. Available from: <https://tradingeconomics.com/yemen/urban-population-wb-data.html>.
3. Health in Yemen: losing ground in war time [Internet]. Institute for Health Metrics and Evaluation. 2019. Available from: <http://www.healthdata.org/research-article/health-yemen-losing-ground-war-time>.
4. Yemeni Civil War (2015–present) [Internet]. En.wikipedia.org. 2019. Available from: [https://en.wikipedia.org/wiki/Yemeni_Civil_War_\(2015%E2%80%93present\)](https://en.wikipedia.org/wiki/Yemeni_Civil_War_(2015%E2%80%93present)).
5. AlAmodiAA[auth] - PubMed - NCBI [Internet]. Ncbi.nlm.nih.gov. 2019. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/?term=AlAmodi%20AA%5Bauth%5D>.
6. Ahmadzai TK e. Protecting public health in Yemen. - PubMed - NCBI [Internet]. Ncbi.nlm.nih.gov. 2019. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/27924773>.
7. Global Humanitarian Overview 2019 [Internet]. OCHA. 2019. Available from: <https://www.unocha.org/global-humanitarian-overview-2019>.
8. Yemen: As conflict escalates, more than 22M people are left in dire need of assistance and protection [Internet]. OCHA. 2019. Available from: <https://www.unocha.org/story/yemen-conflict-escalates-more-22m-people-are-left-dire-need-assistance-and-protection>.
9. Half the population of Yemen at risk of famine: UN emergency relief chief [Internet]. UN News. 2019. Available from: <https://news.un.org/en/story/2018/10/1023962>.
10. WHO EMRO | Cholera and malnutrition in Yemen threatens millions | Yemen-news | Yemen [Internet]. Emro.who.int. 2019. Available from: <http://www.emro.who.int/yem/yemen-news/cholera-and->

- malnutrition-in-yemen-a-real-threat-to-millions-of-people.html
11. Translating a Long Partnership with Yemen into Supporting Yemeni people during Conflict [Internet]. World Bank. 2019. Available from: <https://www.worldbank.org/en/news/feature/2017/01/16/translating-a-long-partnership-with-yemen-into-supporting-yemeni-people-during-conflict>
 12. Counting the costs of the war in Syria [Internet]. World Bank Blogs. 2016. Available from: <http://blogs.worldbank.org/arabvoices/counting-costs-war-syria>.
 13. Yemen Ministry of Public Health [Internet]. Mophpye.org. 2015. Available from: <http://mophpye.org/english/index.html>
 14. Physicians for Human Rights Yemen: Attacks on Health [Internet]. 2019. Available from: https://phr.org/wp-content/uploads/2019/01/Jan_2019-Newsletter_FINAL.pdf
 15. Who.int.2017. Yemen Humanitarian Response Plan 2017.[online]Available at: <http://www.who.int/emergencies/response-plans/2017/yemen/en/>
 16. Icr.org. 2018. Yemen IN FOCUS. [online] Available at: <https://www.icrc.org/en/where-we-work/middle-east/yemen>
 17. Icr.org.2018. Health crisis in Yemen. [online] Available at: <https://www.icrc.org/en/where-we-work/middle-east/yemen/health-crisis-yemen>
 18. Malterud K. Qualitative Methods in Medical Research: An Introduction (Norwegian), Universitetsforlaget, Oslo, Norway, 2003. - Open Access Library [Internet]. Oalib.com. 2019. Available from: <http://www.oalib.com/references/14158826>.
 19. Riley N. Book Review: STEINAR KVALE and SVEND BRINKMANN, Interviews: Learning the Craft of Qualitative Research Interviewing (2nd Edition). Thousand Oaks, CA: Sage, 2009. 354 pp. (including index). ISBN 9780761925422. Qualitative Research. 2010;10(3):390-392.
 20. Qirbi N, Ismail SA. Health system functionality in a low-income country in the midst of conflict: the case of Yemen. Health Policy and Planning. 2017 Apr 11;32(6):911–22.
 21. Holst J, Gericke CA. Healthcare financing in Yemen. The International Journal of Health Planning and Management. 2012 Apr 24;27(3):198–225.
 22. Burki T. Yemen health situation “moving from a crisis to a disaster.” The Lancet. 2015 Apr;385(9978):1609.
 23. Batha E. Yemen’s plunging economy threatens to kill more people than war: aid agency [Internet]. U.S. Reuters; 2018. Available from: <https://www.reuters.com/article/us-yemen-war-economy-hunger/yemens-plunging-economy-threatens-to-kill-more-people-than-war-aid-agency-idUSKCN1LK1YL>
 24. Yemen [Internet]. Doctors Without Borders - USA. 2019. Available from: <https://www.doctorswithoutborders.org/what-we-do/countries/yemen>
 25. Yemen situation reports. World Health Organization [Internet]. 2017 Nov 22. Available from: <https://www.who.int/hac/crises/yem/sitreps/en/>
 26. Amnesty International [Internet]. Amnesty.org. 2018 [cited 2019 Jul 28]. Available from: <https://www.amnesty.org/en/latest/news/2018/06/yemen-restrictions-to-life-saving-supplies-putting-millions-of-civilians-at-risk/>
 27. World Health Organization: WHO. Insecurity drives health workers out of Yemen [Internet]. Who.int. World Health Organization: WHO; 2016. Available from: <https://www.who.int/news-room/feature-stories/detail/insecurity-drives-health-workers-out-of-yemen>
 28. Yemen: Healthcare under siege in Taiz | Médecins Sans Frontières (MSF) International [Internet]. MédecinsSansFrontières (MSF) International. 2015. Available from: <https://www.msf.org/yemen-healthcare-under-siege-taiz>
 29. Langendorf M. Beyond the war: The deep roots of Yemen’s economic crisis [Internet]. alaraby. 2019. Available from: <https://www.alaraby.co.uk/english/indepth/2019/2/8/the-deep-roots-of-yemens-economic-crisis>
 30. Solar Power and the Yemeni Civil War [Internet]. LobeLog. 2019. Available from: <https://lobelog.com/solar-power-and-the-yemeni-civil-war/>
 31. Yemeni Civil War (2015–present) explained [Internet]. Explained.today. 2015. Available from: [http://everything.explained.today/Yemeni_Civil_War_\(2015-present\)/](http://everything.explained.today/Yemeni_Civil_War_(2015-present)/)
 32. English publisher. WHO EMRO | Electronic integrated disease early warning system launched in Yemen | Yemen-news | Yemen [Internet]. Who.int. 2017 . Available from: <http://www.emro.who.int/yem/yemen-news/electronic-integrated-disease-early-warning-system-launched-in-yemen.html>
 33. Reters in Sana’a. Yemen rebels seize US vehicles after embassies closed over security fears [Internet]. the Guardian. The Guardian; 2016. Available from: <https://www.theguardian.com/world/2015/feb/11/british-embassy-in-yemen-evacuated-and-closed-amid-growing-crisis>
 34. Wikipedia Contributors. Airstrikes on hospitals in Yemen [Internet]. Wikipedia. Wikimedia Foundation; 2019. Available from: https://en.wikipedia.org/wiki/Airstrikes_on_hospitals_in_Yemen

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