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Research Article

Analyzing physicians ratings and reviews landscape of a developing country (Pakistan)

Atif Hussain[1]*, Hakeem-ur-Rehman[2], Muhammad Usman Awan[3]

[1,2,3]Institute of Quality & Technology Management, University of the Punjab, Pakistan

*Corresponding Author email: atif.iqtm@pu.edu.pk

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ABSTRACT

Studies on online reviews and ratings of physicians by patients have so far been conducted only in the context of developed countries. Therefore, this study aims to identify popular Physicians Rating Websites (PRWs), study their characteristics and report prevalence, nature and distribution of online ratings and reviews in the context of a developing country (Pakistan). Most popular PRWs were identified and ratings and reviews were scraped using Link Klipper extension and Octoparse software. Scrapped data were then analyzed. To study characteristics and working of PRWs, researchers explored the websites and their apps and also interviewed a psychologist having profiles, ratings and reviews on chosen websites. Two PRWs (marham.pk and oladoc.com) are popular in Pakistan with an Alexa rank of less than 1000 in Pakistan at the time of the study, indicating high popularity. Oladoc has more profiles (15,069) as compared to Marham. However, it has less number of profiles with quantitative and narrative reviews, 23% and 11% as compared to 45% and 30.6% of Marham. Average ratings per rated doctor and average number of reviews per doctor are also greater on oladoc as compared to marham (66.32 and 22.93 as compared to 31.72 and 15.77), respectively. By removing profiles rated on both sites, there are 6,446 unique profiles on both sites which have received at least one rating which has been estimated to be about 3% of the doctors serving the country. It is concluded that online reviews and ratings of physicians is a new but increasing phenomenon. Many of the trends are issues in online ratings and reviews are same as those in the developed countries. As online reviews and ratings increase, the need to ensure objectivity and accuracy as well as user education will also increase, for which government bodies, professional associations of doctors and owners of PRWs will need to collaborate.

Keywords: *Patient Reviews; Physician Ratings Websites (PRWs); Healthcare*

1. INTRODUCTION

In line with the trend of consumers seeking online ratings and reviews before making a decision in the current era , patients are also increasingly leaving and consulting online reviews about health services and professionals (Bernstein & Mesfin, 2020; van Velthoven et al., 2018). As a result there has been a dramatic increase in the use of rating sites (Allen et al., 2020). This increase is attributable to proliferation of internet as well as to patient empowerment moment where patients' perspective is being increasingly given importance in provision of healthcare services (Hong et al., 2019). These sites provide both the opportunity to give the feedback and obtain information (Yu, et al., 2020). These sites do in fact influence patients' decision making (Bensnes & Huitfeldt, 2021; Furnas et al., 2020;

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Zhang et al., 2020). Research interest in these sites has also naturally increased and many a studies has been conducted about these websites (Lagu et al., 2017; Rothenfluh & Schulz, 2018).

Internet access and use in developing countries has continuously been rising for many years (Poushter & others, 2016). Internet use in Pakistan has also increased dramatically – a 21% growth in internet users has been witnessed between 2020 and 2021 alone with the total internet users now standing at 61.34 million (Datareportal, 2021). An initial study indicates that university students have good eHealth literacy (Tariq et al., 2020). However, all studies on PRWs and physicians ratings have been conducted in the developed countries and China (Hong et al., 2019) and no such study has been conducted in Pakistan or any other developing countries to date to the best of these authors' knowledge.

Such as study is needed and timely because on the theoretical side, despite the increased availability of internet in the developing world, there is no understanding what the physician rating websites landscape is how similar or different it is to the developed world. Moreover, on the practical side, where proliferation of online reviews of physicians provides opportunities to improve as well as create a digital brand (Hong et al., 2019; Khanna & Diab, 2021), growing consumerism in healthcare sector poses many threats (Khanna & Diab, 2021) and gives rise many ethical questions (Samora et al., 2016). Potential negative impact on physicians (Evans, 2018), ensuring accuracy of information and need to educate patients about the limitations of the online ratings and reviews in order to save them from making misinformed decisions has important policy implications (Hong et al., 2019; Khanna & Diab, 2021; Samora et al., 2016).

2. PREVIOUS STUDIES

Earlier studies on the PRWs have focused both on website characteristics or presence of the physicians of a specific geographical location or specialty on these websites. Lagu et al., (2017) searched for PRWs in US and studied their characteristics. They also searched a sample of 600 physicians on these websites. Sites differed in background information provided about physicians and aspects of service rated. Only a small percentage (27%) of the sampled physicians had received a review on any website.

Rothenfluh & Schulz (2018)conducted a comprehensive review of PRWs world over. 143 sites were identified which were mostly found to be commercial in nature. Most website were registered in US and Germany, asked for both the numerical and qualitative reviews of the physicians, provided little professional information about registered doctors and had a low overall quality. Websites differed greatly in the aspects of the physician service presented to patients for rating.

Some studies have explored the presence and ratings of the physicians of a particular specialty on PRWs. For example Goshtasbi et al., (2019) studied the presence of American neurologists on PRWs and reported that 84% of them were rated on at least one site. Their ratings were mostly positive. Similarly, Gilbert et al., (2015) studied presence of radiologists on PRWs and found that only 19.7% of randomly selected radiologists were present on any of the website.

A number of country specific studies have also been conducted, a summary of which is presented in Table 1.

3. STUDY OBJECTIVES

Accordingly, the objectives of the current study are:

1. To study the characteristics of popular PRWs in Pakistan

Table 1. Summary Earlier Country Specific Studies

Sr#	Authors, Year	Country	Methodology	Findings
1	Atkinson (2014)	Australia	Studied Australian PRWs	Only 4.4% of Australian doctors were rated on these websites.
2	Hao (2015)	China	Studied the largest PRW in China and reported the number of doctors registered and those who had received quantitative or qualitative reviews. It also reported reviews by specialty.	37% of the physicians registered on the website were found to have had a review. Traditional Chinese medicine doctors and gynecologists had the most reviews and the most ratings were positive.
3	McLennan et al., (2017)	Germany	Chose a stratified random sample of 298 German doctors from the state of Hamburg and Thuringa and searched them on 7 PRWs.	A maximum of 94.6% found on a website and 83.2% were found rated on a website. Highest number of ratings per physician on a website was found to be 7.5. Only two websites out of seven were among top 10,000 most visited sites in Germany.
4	Bäumer et al., (2018)	Lithuania	Studied the largest Lithuanian PRW.	Of 57,311 profiles on the website, only 16% had received at least one quantitative rating and 12% at least one text review. Most of the text reviews (76%) were positive.
5	Liu, Matelski & Bell (2018)	Canada	Studied ratings of Canadian physicians on RateMD	57,412 physicians were found to have 640,603 ratings, which were mostly positive. Some specialties (e.g., gynecology, dermatology) were more commonly rated, whereas a few other specialties (e.g., radiology and anesthesia) were less commonly rated. Physicians practicing in Eastern provinces were more likely to be rated positively.
6	McLennan (2019)	Switzerland	Chose a random sample of Swiss physicians and searched them four PRWs. And reported how many doctors are registered on these websites and how many have received quantitative or qualitative reviews.	While 87% were registered on at least one of the websites, the number of physicians getting a quantitative review was much less. A maximum of 273 (out of the sample of 966) physicians had received ratings on one website and those who had received ratings had only a small number of qualitative reviews. Ratings were found to be mostly low.

1. To study the prevalence, nature and geographical and specialty-wise distribution of physicians' ratings on chosen Pakistani PRWs.

2. To compare the nature, prevalence and distribution of ratings on chosen PRWs with the same characteristics of ratings in developing countries.

4. METHODOLOGY

4.1. Selection of Websites:

In line with the previous studies, google searches like “doctors near me”, “doctors in Pakistan”, “doctors rating, Pakistan” were run to discover popular Pakistani PRWs. Two sites, marham.pk and oladoc.com were consistently returned in these searches. Global rank of marham.com as of May 2021 is 67,567 and 805 in Pakistan. The second site oladoc.com ranks 50,695 and 531 in Pakistan. Two more sites instacare.pk and healthwire.pk were also discovered, but were not considered for this study as they rank quite low in comparison and very few ratings and reviews were found on them.

4.2. Study of Website Characteristics

Website characteristics were studied on the lines provided by Lagu et al., (2017) and Rothenfluh & Schulz (2018). One of the researcher installed mobile apps of the both websites as well as explored websites and tried making appointments and posting reviews. A psychologist, having profiles and reviews on both the sites was also interviewed to understand various aspects of the working of these sites.

4.3. Scraping of Ratings and Reviews

Ratings and reviews for doctors were scrapped from these websites with the help of a software called Octporase, which has been used in earlier studies to scrap ratings (Etumnu et al., 2020)and reviews (Yadav & Roychoudhury, 2019). Under ethical consideration, to avoid overloading the website server, first URLs were scraped using Link Klipper Chrome extension, which has also been used in earlier studies (McGurk & Caquard, 2020; Pirveli, 2020) and then URLs were fed to Octoparse, maximum of a thousand at a time, over a period of 10 days from April 21-30, 2021.

5. RESULTS AND DISCUSSIONS

Characteristics of both the websites and content are summarized in Table 2. Both the websites are commercial in nature and provide detailed background information about the physicians.

Table 2. Website Characteristics and Content

	Marham.pk	Oladoc.com
General Web Characteristics		
Nature	Commercial	Commercial
Offers appointment	Yes	Yes
Charges physicians for appointment	Yes	Yes
Advertising	No	No
Physician Information		

	Marham.pk	Oladoc.com
Name	Yes	Yes
Work Address	Yes	Yes
Work Phone	No	No
Office Hours	Yes	Yes
Email address of practice	No	No
Age of physician	No	No
Gender of Physician	No	No
Directions to find address	No	Yes
List of medical conditions that the physician treats	Yes	Yes
Website of the Physician	No	No
Awards and Honours	No	No
External quality assessment results	No	No
No of procedures performed/patients treated	No	No
Hospital Affiliation	Yes	Yes
Education	Yes	Yes
Years of Experience	Yes	Yes
Consultation Fee	Yes	Yes
Publications	No	No
Professional Associations	No	Yes
Questions asked as part of structured review		
Doctor Checkup	No	Yes
Waiting Time	Yes	No
Clinic Environment	NO	Yes
Staff	Yes	Yes
Consultation Time	Yes	No
Overall Satisfaction	Yes	Yes
Reporting of Overall Rating		
5 Stars Scale	Yes	No
Percentage	Yes	Yes
Profile Upgrade		
Profile Upgrade Offered	Yes	Yes
Profile Upgrade Offered for Free	No	No
Profile Upgrade offered for a fee	Yes	Yes
Search Criteria		
Physician Name	Yes	Yes
Specialty	Yes	Yes
Area of Expertise	Yes	Yes
Clinical Condition	Yes	Yes
Gender	Yes	Yes
Availability of Video Consultation	Yes	Yes

However, in stark contrast to 96% of the websites studied by Lagu et al., (2017) and 81% of those studied by Rothenfluh & Schulz (2018), none of these websites provide practice contact. This is because the websites studied by them might have been review only websites, but these two websites provide appointment service and charge physicians a certain percentage of the consultation fee for the appointments made through them. Therefore, they provide their own contact number instead of direct contact of the physician so that appointments are made through them. Work address, however, is provided by both the websites and oladoc.com also provides google maps link for directions. Both the

websites provide their own video consultation platforms which are being increasingly used by patients and physicians.

Regarding total number of registered doctors and reviews, an overview is provided in Table 3. Oladoc has more profiles (15,069) as compared to Marham. However, it has less number of profiles with quantitative and narrative reviews, 23% and 11% as compared to 45% and 30.6% of Marham. Average ratings per rated doctor and average number of reviews per doctor are also greater on oladoc as compared to marham (66.32 and 22.93 as compared to 31.72 and 15.77, respectively.)

Table 3. Overview of Ratings and Reviews

	Marham.pk	Oladoc.com
Total registered profiles	9,003	15,069
Profiles with at least one quantitative rating	3,689	3,488
Percentage of total profiles having ratings	45%	23%
Total ratings	117,011	231,309
Average quantitative ratings per doctor	31.72	66.32
No of doctors with less than 10 ratings	1920 (52%)	1109 (32%)
No of doctors with 3 or less ratings	1149 (31%)	481 (14%)
Eighty percent of the ratings accounted by	871 (24%)	869 (25%)
Profiles with at least one narrative review	2,753	1,634
Percentage of profiles having narrative reviews	30.6%	11%
Total Reviews	43,405	37,471
Average reviews per doctor	15.77	22.93
Average Satisfaction Score	97%	98%

Accurate number of doctors in Pakistan is not known. World Health Organization (WHO) estimates (cited in Shaheen et al., (2021)) that there are 8 doctors for each 10,000 people in Pakistan. By this proportion, there should be approximately 173,000 doctors in Pakistan for the current population of 216.6 millions. However, world bank (World Bank, 2018) estimates that there are 0.98 doctors for every 1000 persons in Pakistan. This estimate puts the current number of doctors to be around 212,000. Website of Pakistan Medical Commission shows the number of registered doctors to be 281,072 (Pakistan Medical Commission, 2021). However, it is not clear if all these doctors are serving in Pakistan are not. Assuming this number includes the doctors working overseas and in administrative roles within Pakistan, World Bank estimate seems quite reasonable. There are 3,689 profiles with at least one quantitative rating on marham and 3,488 on oladoc with 731 profiles rated on both sites, giving a total of 6,446 unique profiles rated on both sites, which is around 3% of total doctors in Pakistan. This number is lower than that reported by studies conducted in the developed world. The lowest number reported in literature, 4.4% in Australia Atkinson (2014) is also greater than this number, not to mention that it was reported 7 years ago. This maybe attributable to low internet access, internet speed and literacy in Pakistan as compared to developed countries. However, the low percentage of the physicians with quantitative ratings and a still lower percentage of those with a narrative review, is consistent with the trends in US (Lagu et al., 2017), Germany (McLennan et al., 2017), Switzerland (McLennan, 2019), China (Hao, 2015) and Lithuania (Bäumer et al., 2018).

Ratings are not distributed evenly across specialties either. As Table 4 shows, of 85 specialties of marham and 105 of oladoc, 18 account for roughly 80% of the ratings and reviews on both the sites. Interestingly, of 18 top specialties, 13 are the same on both sites .

Table 4. Top Specialties by No of Ratings

Marham (Total Specialties = 85)								Oladoc (Total Specialties = 105)							
Sr #	Speciality	No of Ratings	%age	Com. %age	No of Reviews	%age	Com. %age	Speciality	No of Ratings	%age	Com. %age	No of Reviews	%age	Com. %age
1	Dermatologist	11392	10%	10%	2951	7%	7%	Dermatologist	26040	11%	11%	4256	11%	11%
2	Gynaecologist	10508	9%	19%	3722	9%	15%	Gynaecologist	18644	8%	19%	3499	9%	21%
3	Gastroenterologist	7594	6%	25%	1669	4%	19%	Internal-medicine	13854	6%	25%	2078	6%	26%
4	Psychologist	6791	6%	31%	5079	12%	31%	ent-specialist	13533	6%	31%	2095	6%	32%
5	Urologist	6538	6%	37%	1587	4%	35%	Urologist	13006	6%	37%	2155	6%	38%
6	Psychiatrist	6298	5%	42%	1981	5%	39%	Orthopaedic-surgeon	11548	5%	42%	2041	5%	43%
7	neuro-physician	6012	5%	47%	572	1%	40%	Eye-specialist	11367	5%	47%	1899	5%	48%
8	General-physician	4581	4%	51%	2054	5%	45%	Neurologist	10799	5%	51%	1361	4%	52%
9	Dentist	4269	4%	55%	2645	6%	51%	Gastroenterologist	9584	4%	55%	1446	4%	56%
10	Nutritionist	4173	4%	58%	2543	6%	57%	Paediatrician	9116	4%	59%	1335	4%	59%
11	orthopaedic-surgeon	4167	4%	62%	1161	3%	60%	Pulmonologist	8193	4%	63%	1119	3%	62%
12	Endocrinologist	3824	3%	65%	568	1%	61%	Psychiatrist	7004	3%	66%	1213	3%	65%
13	Pulmonologist	3514	3%	68%	644	1%	63%	Cardiologist	6833	3%	69%	951	3%	68%
14	Paediatrician	3419	3%	71%	1269	3%	66%	Dentist	6718	3%	72%	1191	3%	71%
15	Physiotherapist	3231	3%	74%	2564	6%	71%	general-surgeon	6207	3%	75%	1158	3%	74%
16	Nephrologist	2795	2%	76%	516	1%	73%	Diabetologist	6031	3%	77%	1093	3%	77%
17	eye-surgeon	2450	2%	78%	604	1%	74%	Nephrologist	5260	2%	79%	723	2%	79%
18	general-surgeon	2384	2%	80%	1036	2%	76%	neuro-surgeon	4720	2%	81%	717	2%	81%

Table 5. Top 20 Most Frequently Rated Specialties (Minimum 50 Doctors in the Specialty)

Marham						Oladoc					
Speciality	Total No of Registered Doctors	No of Doctors with Ratings	Percentage of Doctors with Ratings	No of Doctors with reviews	Percentage of Doctors with reviews	Specialties	Total No of Registered Doctors	No of Doctors with Ratings	Percentage of Doctors with Ratings	No of Doctors with Reviews	Percentage of Doctors with reviews
speech-therapist	52	33	63%	24	46%	Diabetologist	121	58	48%	36	30%
Nutritionist	303	178	59%	164	54%	Urologist	256	118	46%	62	24%
Psychologist	588	341	58%	313	53%	Dermatologist	448	205	46%	121	27%
Endocrinologist	86	48	56%	39	45%	Rheumatologist	51	21	41%	13	25%
Dermatologist	391	202	52%	159	41%	orthopaedic-surgeon	465	190	41%	94	20%
Homeopath	154	79	51%	72	47%	consultant-physician	79	31	39%	18	23%
Psychiatrist	229	110	48%	82	36%	internal-medicine	520	203	39%	92	18%

	Marham						Oladoc				
Speciality	Total No of Registered Doctors	No of Doctors with Ratings	Percentage of Doctors with Ratings	No of Doctors with reviews	Percentage of Doctors with reviews	Specialties	Total No of Registered Doctors	No of Doctors with Ratings	Percentage of Doctors with Ratings	No of Doctors with Reviews	Percentage of Doctors with reviews
Urologist	204	97	48%	74	36%	Gastroenterologist	271	102	38%	43	16%
Physiotherapist	518	246	47%	223	43%	Nutritionist	55	20	36%	7	13%
family-medicine	73	34	47%	29	40%	paediatric-surgeon	56	20	36%	6	11%
Gastroenterologist	210	96	46%	76	36%	Psychologist	186	62	33%	24	13%
neuro-physician	138	63	46%	44	32%	plastic-surgeon	162	52	32%	22	14%
Dentist	539	244	45%	181	34%	neuro-surgeon	226	68	30%	30	13%
Pulmonologist	170	76	45%	50	29%	Endocrinologist	67	20	30%	9	13%
ent-surgeon	123	53	43%	28	23%	ent-specialist	427	122	29%	68	16%
eye-surgeon	121	52	43%	37	31%	laparoscopic-surgeon	69	19	28%	7	10%
internal-medicine	235	97	41%	66	28%	Oncologist	69	19	28%	13	19%
Nephrologist	119	49	41%	31	26%	Pulmonologist	280	77	28%	37	13%
orthopaedic-surgeon	339	135	40%	77	23%	family-physician	103	28	27%	13	13%
paediatric-surgeon	70	27	39%	16	23%	Neurologist	255	69	27%	38	15%

However, specialties with the highest cumulative ratings are not necessarily the most frequently rated. Specialties (in which there are at least 50 doctors) with highest percentage of doctors rated are different from those with highest cumulative ratings. These findings are consistent with the results of earlier researches of Hao (2015)and Liu et al., (2018).

Table 6. Top Ten Cities

Marham (Total Cities=120)						Oladoc (Total Cities = 40)					
City	Total Registered Doctors	City %age	Com. City %age	Rated Doctors	Rated %age	City	Total Registered Doctors	City %age	Com. City %age	Rated Doctors	Rated %age
Lahore	2458	27%	27%	1116	45%	Karachi	6424	43%	43%	815	13%
Karachi	2087	23%	50%	664	32%	Lahore	3973	26%	69%	1164	29%
Islamabad	1108	12%	63%	461	42%	Islamabad	1469	10%	79%	471	32%
Rawalpindi	673	7%	70%	264	39%	Peshawar	798	5%	84%	234	29%
Faisalabad	312	3%	74%	159	51%	Rawalpindi	741	5%	89%	235	32%
Peshawar	277	3%	77%	100	36%	Faisalabad	591	4%	93%	151	26%
Multan	276	3%	80%	129	47%	Multan	503	3%	96%	276	55%
Quetta	235	3%	82%	145	62%	Hyderabad	157	1%	97%	19	12%
Gujranwala	199	2%	85%	79	40%	Quetta	94	1%	98%	7	7%
Hyderabad	186	2%	87%	63	34%	Bahawalpur	78	1%	98%	30	38%

As far as geographical distribution of the ratings is concerned, unsurprisingly, most ratings come from big cities. Top 10 cities, in case of marham, account for 87%. In case of oladoc,

top 10 cities account for 98% of the total ratings. Interestingly, when rated doctors are expressed as percentage of the total doctors in a city (Table 6), only a small percentage of the doctors from the biggest city of Karachi is revealed to have been rated. There are some other differences in between the both sites as well. For example, 43% of the total doctors registered on oladoc are from Karachi, whereas only 23% of those on marham are from Karachi. Similarly, whereas 62% of the doctors from Quetta are rated on Marham, only 7% are rated on oladoc. This indicates regional differences in popularity of the two sites.

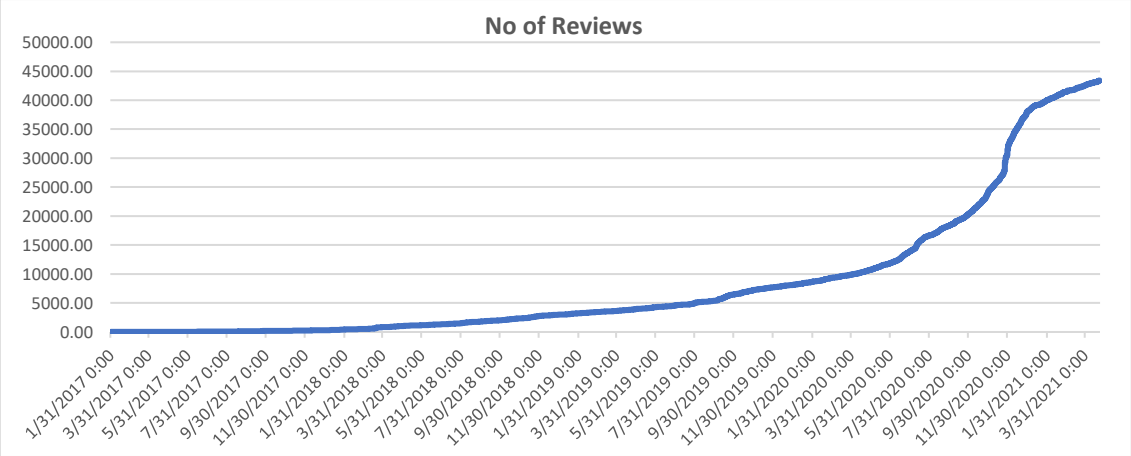
There are more than 80,000 narrative reviews on both the websites (complete breakup by specialty is given in Table 8) which are mostly in English can be used to for text mining analytics studies like those of He et al., (2020) and Hao, Zhang et al., (2017)

Finally, we evaluate physician rating landscape of Pakistan against the list of the data quality issues compiled by Mulgund et al., (2020). Results are presented in Table 7.

Table 7. Data Quality Issues

Sr#	Data Quality Issue	Marham	Oladoc
1	Overwhelmingly positive ratings	Yes	Yes
2	Ratings either too positive or too negative	Data Not Available	Data Not Available
3	Emotionally charged comments in reviews	Not Studied	Not Studied
4	Ratings influenced by marketing	Not Studied	Not Studied
5	Anonymous ratings	Yes	No
6	Hiding of comments by premium physicians	No	No
7	Lack of trust in ratings by physicians	Not Studied	Not Studied
8	Lack of finer granularity in rating scales	Yes	Yes
9	Impact of the position of positive and negative reviews	Not Studied	Not Studied
10	Underlying scale to evaluate physician different than others	Yes	Yes
11	Low volume of reviews and ratings	Yes	Yes
12	Ratings based on perception not objective measures	Yes	Yes
13	Ratings based on indirect factors not direct characteristics of physicians	Yes	Yes
14	Low correlation of ratings with surgeons' websites	Not Studied	Not Studied
15	Certain specialties have more ratings	Yes	Yes
16	Reviews only by a certain class	Yes	Yes
17	Very few ratings	Yes	Yes
18	Presence of halo effect	Not Studied	Not Studied

As can be seen from Table 7, most of the data quality issues are present in case of Pakistani PRWs. However, it must be noted that all of these are the general issues with PRWs which have been widely reported in existing literature. Although the volume of ratings is low in comparison with the developed countries, but that is not much of an issue at this stage as the phenomenon has just begun. Reviews scraped from marham have time and date with them, which enables us to make the graph shown in Figure 1, which clearly indicates an increasing trend. Use of websites has increased due to COVID-19 pandemic as well.



Overwhelmingly positive ratings may not be the result of non-response, but as Smironva et al., (2020) have noted in case of hotels, due to self selection bias as well as because hotels listed on booking websites may already have ensured certain level of quality. Another factor, in case of physician ratings, may be the fact the one feels generally good after seeing and listening to reassuring talk of the doctor. Doctors with private practice normally value patients as customers and treat them well.

The effect of the inflated ratings affected by halo effect can be minimized with better measures in structured reviews, where patients are asked to rate objective outcomes of treatment instead of indirect and vague physician attributes.

The real problem is the way one of the websites (marham) allows unsolicited reviews on its website. Oladoc has a very stringent mechanism of posting reviews, where only the patients who booked through the website are sent a link afterwards which they can use to post a review. Marham, on the other hand, in addition to the procedure, also allows to post reviews on the website. These reviews are then verified by the site representative by asking the physician if the person posting the review is actually a patient. This mechanism is not fool proof and can be used to post positive reviews by doctors' themselves. More suggestions for improvement are given in the recommendation section of this paper.

6. CONCLUSION, RECOMMENDATIONS AND FUTURE RESEARCH

This study analyzed the physician ratings and review landscape in a developing country – Pakistan. There are relatively fewer ratings and reviews as compared to developed countries but show an increasing trend. Nature and distribution of ratings, however, follow the same trends as developed world. Data quality issues reported in literature are also present. An importance difference, however, in the nature of two most popular PRWs and most of the PRWs considered in earlier studies is the Pakistani PRWs are not merely rating and review sites but these provide appointment making services to patients and physicians and charge a percentage of fee charged by the physician from patients who make appointment through these sites.

As the websites can influence patient choices, it is of utmost importance that as Yaraghi et al., (2018) suggest the accuracy of data is ensured as well as patients are educated how to interpret and use PRWs.

Healthcare regulatory bodies and professional associations of physicians should collaborate with PRWs owners to improve objectivity, transparency and accuracy of ratings and reviews and educate users. Websites can display some message to every visitor educating them about strengths and limitations of physician ratings and reviews. Similarly, physicians and PRWs staff can educate patients about importance and method of posting fair and objective reviews.

Future studies should focus on the studying narrative reviews on these PRWs to gain more insight into the experiences and preferences of Pakistani patients. Studies may also be conducted on the characteristics of the patients rating physicians and positing reviews on PRWs or impact of these ratings and reviews on physicians' patients volume and earnings.

7. LIMITATIONS:

Due to unavailability of reliable specialty and city-wise data of the doctors in Pakistan, we could not compare total number of doctors in a city or a specialty with the number of doctors registered or rated on PRWs. The study also did not qualitatively analyze narrative reviews.

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