Barriers Faced by Rural and Non-Rural Primary Care Physicians During the Process of Seeking Health Information from their Practice Settings

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To compare the barriers (e.g., relating to health information content, efficiency, availability, etc.) that obstruct the health information behavior of primary care physicians (PCPs) in a rural versus non-rural practice setting. A survey was conducted in the Public health facilities of the District of Multan, Pakistan. Primary care physicians (PCPs) were classified into rural and non-rural according to their practice setting. The term non-rural was used to avoid the confusion with other terms such as urban and metropolitan. Convenience sampling was used to gather the data for this study. Post-hoc Chi-square test was applied to assess any difference between the demographic information of the rural and non-rural PCPs. Mann-Whitney U statistics were applied to assess the differences among the barriers (e.g., relating to health information content, efficiency, availability, etc.) faced by PCPs in rural and non-rural practice settings. The difference in gender of the PCPs was much higher in rural than non-rural practice settings. Almost half the respondents were in the 31-40 year age range, and that– of this group most were working in non-rural settings. The barriers faced by PCPs (relating to health information content, availability, cost, efficiency and skills) in rural and non-rural practice settings were significantly different. Age as well as working experience was statistically significant factors which were perceived by PCPs as the barriers lying in their way of seeking health information. The findings of this study showed that PCPs in a non-rural setting faced significantly greater barriers relating to information content, efficiency, skills, availability, and cost) than the ones faced by PCPs in a rural setting.

Keywords Barriers, Health information Behavior, Information access, Primary care physicians.

Introduction

Under the constitution of Pakistan, health is a Provincial Government subject. However, the Central Government plays an important role in policy making, seeking foreign assistance, providing technical support, trainings and establishing coordination among various health organizations. The Provincial Government executes the provision of health care delivery at the ground root level of every District through the Executive District Officers (Health). The largest Province of Pakistan, Punjab has a broad network of public and privately managed health infrastructure, however Government is the major provider of health care throughout the province. Public sector health care delivery system comprises four tiers: (i) outreach and community based services, (ii) primary health care, (iii) secondary health care, and (iv) tertiary care. A relatively large infrastructure of primary and secondary health care exists in Pakistan which includes 5534 basic health units (BHU's), 600 rural health centers (RHC's), and about 7500 other first-level care facilities (e.g., dispensaries and MCH centers). A BHU provides health care

services to the population of around 10,000 and RHC between 30,000 to 45,000 (Pakistan Economic Survey, 2006-07, 2012-13). However, tertiary care hospitals are situated in major cities for more specialized outdoor and indoor patient's care.

Literature Review

The concept of "information" is of single importance to all the information disciplines (Bates, 2010). Shannon (1993) described that the term "information" has been explained and given different meanings by researchers in the field of information. This is probably due to the myriad of explanations of the term "information" over many years. It would be fair to say that even today no consensus or widely agreed upon definition or theoretical conception of the term "information" has been developed. The meaning and explanation of this term still remains highly challengeable. Most of the times, the status of the term "information" is taken as similar to "communication" in the information or communication sciences literature. However, the terms "information" and "behavior" were first used together at a *Royal Society Scientific Information Conference* held in 1948. A few research papers that were presented in this conference addressed the information behavior of scholars and technologist (but the term "information behavior" yet had to be explained precisely) which indicates that the term "information behavior" was even used before the term "information science" which was first used in 1954 (Wilson 1999a). After the conference, many researchers and authors went on explaining the terms "information seeking", "information searching", and "information behavior". Case (2007) identified more than 1100 titles in his study which have covered the area of information needs and seeking behaviors. Information behavior has been defined as "how people need, seek, manage, give and use information in various situations and contexts" (Savolainen, 2010). It may also be described as "information-seeking behavior" or "human information behavior". Case (2007) described that information behavior is a wider term used as an umbrella, under which other terms come, such as "information needs" "information seeking behavior" and "information use". Wilson (2000b) identified the differences between "information seeking" and "information searching" behaviors; the process of finding purposeful information from printed or electronic sources is called "information seeking behavior", while the "micro level" behavior adopted by a person to search information from all kinds of information systems is called "information searching behavior".

Wyatt and Sullivan (2005) indicated that during a clinical practice, physician's encounters several barriers while seeking new health information; the most common barrier is to identify the recognized needs i.e. whether there is a need for further information or the existing knowledge is sufficient to treat a particular patient. The link between Taylor (1967) and Gorman and Helfand (1995) work has showed that the doctors don't not look for information unless they are sure they can find it. So today, a dire need exists to focus on the difference between the formalized need; when the doctors realize that they have an information gap and the stage of compromised need, where they present their need to an information system. Urquhart (2007) reported after evaluating eighteen-months clinical librarian project conducted in North Wales, UK that the collaboration with a clinical librarian increased clinician willingness to seek health information.

Primary care physicians (PCPs) deal mostly with conditions that can be managed in primary care, but they occasionally need access to the latest evidence, just to check what should be done for a patient where they suspect more specialist care, or a different treatment is required. For PCPs in all countries, it is difficult to find the information they need very quickly (although there are some services that have been developed to help those physicians- for example the work that the *British Medical Association* has done via *Clinical Evidence*, to produce systematic reviews which are easy to be read. The *Cochrane*

Collaboration has tried to make their reviews accessible to developing countries, and freely available, but the format probably is not easy, and RCTs generally look at conditions and treatments that may be less relevant to the developing world (Davies, 2011). The work *World Health Organization (WHO)* has done on *Health Internetwork Access to Research Initiatives (HINARI)* with collaboration of major publishers enabled the developing world to gain access to the free or very low cost up to 14,000 online journals and 46,000 e-books in biomedical and related social sciences (Ajuwon and Olorunsaye, 2013). But this free or very low cost access to *HINARI* is not applicable on many developing countries and Pakistan is one of them. Efforts have also been made through designing and implementing outreach health information and library services to improve the access of health information (e.g., London Health Libraries (LHL) provided outreach services to primary care of mental health workers (Robinson, *et al.,* 2007). National Library of Medicine (NLM) has conducted number of outreach programs to the health professionals (Cogdill, *et al*., 2007), etc.).

Multiple types of information sources exist which provide latest information to doctors, but the most important types of the sources are formal (print and electronic) and informal (personal communications) sources. A few studies reported that doctors use interpersonal contact (e.g., colleagues, consultants, experts and pharmaceutical representative, etc.) as a source for seeking health information. Health sciences libraries, librarians, treatment guidelines, and national policies are also considered important formal sources for seeking health information (e.g., Davies & Harrison, 2007; Kapairi & Bonday, 2006; McGettigan, *et al* 2001, etc.). However, many other studies established the high use of electronic resources by physicians through Internet, for example, (i) the bibliographic and full text databases (e.g., MEDLINE/PubMed, MD Consult, UpToDate, etc.) (ii) electronic evidence-based medicine resources (e.g., Cochrane systematic reviews, clinical evidence, etc.) and (iii) Electronic Medical Records System (EMPRS), which provides access to diagnostic and treatment notes. Apart from these categories, various websites are also available to provide current clinical information regarding patient's care (e.g., Davies, 2011; Wyatt and Sullivan, 2005; Cullen, 2002, etc.). Electronic resources have a positive impact on physician's day to day clinical practice, particularly on treatment choices. Despite the high use and positive impact of electronic resources, the credibility, relevancy, cost, lack of time, and limited access to information resources are amongst the major barriers that obstruct physician's information seeking behavior (e.g., Arul, 2012; Nail- Chiwetalu and Rathner, 2007; Casebeer, *et al.,* 2002, etc.). Many demographic and geographic barriers have also been reported in the literature e.g., non-availability of local library (Hulkonen, 1986; Bowden, 1994), solo practice, older age of the clinician, rural location (Ely, 1992), small community size, and greater number of years in practice (Short, 1999), lack of time, and kind of general practices (Marshall, 1989), etc.

Many of the barriers reported here are associated with rural practices. Siddiqui (2009) established that physicians in a rural practice suffer more with inadequacy of information resources, geographic isolation, and limited opportunities for continuing professional development (CPD). The challenge for seeking health information from a rural practice setting is of a serious nature for PCPs, due to; (i) broad domain of practices, and (ii) geographic isolation which limit their access to seniors, colleagues, health sciences libraries and librarians, latest health information resources, and modern equipment. Wesley (1999) recommended that it is useful to identify the barriers that obstruct health information behavior, between clinicians working in rural (limited or no access to health information resources) and those working in non-rural practice settings (access to health information resources). Previous research has explored the different aspects that obstruct physicians' information behavior (e.g., Dee and

Blazek 1993; Shelstad and Clevenger 1996; Bryant, 2004; Lappa 2005, etc.), few studies have also been carried out in Pakistan (e.g., Naeem & Bhatti, 2015; Naeem *et al.,* 2013a; & Naeem *et al.,* 2013c, etc.). However, to the best of our knowledge, no study has been conducted previously in Pakistan aimed at comparing the barriers faced by PCPs in rural and non-rural practice setting while seeking health information. Therefore, this study was carried out to fill the existing gap.

The results of the present study highlight the barriers faced by PCPs in a rural and non-rural practice setting and draw the attention of policy makers, health sciences librarians, and professional associations to take necessary measures to address these barriers.

Hypothesis of the study are as follows;

H0: There is no difference in the demographic information (e.g., gender, age, working experiences, and continuing medical education) of PCPs working in a rural and non-rural practice setting of Multan District, Pakistan.

H0: There is no difference in the barriers (relating to information content, efficiency, skills, availability and cost) faced by PCPs while seeking health information in rural and non-rural practice setting of Multan District, Pakistan.

Research Methodology

We developed a survey to gather data for this study (Appendix 1). The study was conducted in seventy-seven Basic Health Units (BHUs), seven Rural Health Centers (RHCs), two Tehsil Head Quarters (THQs), one District Head Quarters (DHQs) and three Tertiary Care Hospitals (TCHs) in Multan District, Pakistan. A population of this study comprised both male and females primary care physicians (PCPs). PCPs were divided in two groups (rural and non-rural) according to their practice setting. We used a definition of 'rural' (more than 10 miles from a population center of 30,000 or more) defined by the *State Office of Rural Health,* to identify the rural practice setting. The term non-rural was used to avoid the confusion with other terms such as urban and metropolitan. Convenience sampling was used to gather the data for this study.

A Pakistani study questionnaire (Salman and Bhatti, 2015) was used as a basis for instrument development to measure the barriers faced by rural and non-rural PCPs (Appendix 1).

The study was started after the permission of Executive District Officer (EDO) Health, Multan and PCPs participated in this study voluntarily. The first draft of the questionnaire was pre-reviewed for the content validity by two PCPs having more than 8-years of experiences and one health sciences librarian of a participating hospital. Questionnaire was divided in two parts. The first part solicited responses related to the demographic information of the respondents which included; gender, age group, practice setting, working experiences, and enrollment in post-graduation programs. The second part of the questionnaire was related to the questions regarding the barriers that obstruct physician's health information seeking behavior. This part was divided into five sub-scales which were related to the questions regarding (i) content, (ii) efficiency, (iii) skills, (iv) availability, and (v) cost. The content reliability and internal consistency of each sub-scale of the questionnaire was assessed through Cronbach's Alpha, which indicated Cronbach's Alpha score ranging from .74 to 89 for the different sub scales of the questionnaire, indicating high reliability and internal consistency of the questionnaire.

A Five point Likert scale ('5=Always, 4=Very Often, 3=Sometimes, 2=Rarely, 1=Never') was used in the questionnaire to gather the data from the participants. The collected data was analyzed statistically using SPSS (Statistical Package for Social Sciences v-20). Post-hoc Chi-square test was applied to assess any differences between the demographic information of the rural and non-rural PCPs (Table. 1). Mann-Whitney U statistics were applied to assess differences among the barriers relating to health information content, availability, skills, efficiency, and cost of the information faced by PCPs in rural and non-rural practice settings

(Table 2). The reason we applied non-parametric Mann-Whitney U test was that the collected data was not statistically homogenous and normally distributed (Table. 2). A Mann-Whitney's U testhelps in calculating the rank for each value instead of using the values as they are. The higher mean rank shows the higher level of a barrier in Table-2. The dichotomous variable "practice setting" that has two values rural and non-rural taken as grouping variable, and barriers (e.g., relating to content, skills, availability, etc.) were taken as test variables in this study while computing the variables in SPSS.

For a purpose of determining any difference in PCPs' age, working experience, and perceived barriers to seeking health information, we computed the responses on barriers (e.g., content, efficiency, skills, etc.) in sum in order to make these variables continuous to run the parametric statistics One-way ANOVA, which is quite robust. Pre-determined alpha value set for this study was 0.05.

Results

Response rate A total of 275 copies of the questionnaire were distributed to 150 non-rural primary care physicians and 125 rural. To increase the response rate, rural PCPs were followed up twice and non-rural thrice with a gap of 10-days through SMS, phone calls, emails, and visits to their practice settings. One hundred and four (69.3%) non-rural and 101 (80.8%) rural PCPs responded to the questionnaire. Four non-rural and one rural response were randomly discarded from this study to keep an equal number of respondents in both groups resulting in 100 (66.6%) non-rural and 100 (80%) rural usable responses from PCPs for data analysis.

Demographic information Using post-hoc chi-square analysis, a statistically significant difference with a small effect was found between the gender distribution of rural and non-rural PCPs (*χ2 (1) =6.818, p =.008, Phi =.185*) (Table 1). The difference between the gender of the PCPs was much higher in rural than non-rural practice settings. There were significantly more male PCPs in both practice settings but more female in non-rural than rural practices. Almost half of the respondents were in the 31-40-year age range, and that– of this group most of them were working in non-rural settings. PCPs working in rural areas tended to be ager as compared to non-rural PCPs and this was also reflected in the years of experience. A statistically significant difference with a medium effect was found using post hoc chi-square analysis between the age groups of rural and non-rural PCPs (*χ2 (3) =45.619, p =.000, Cramer's V =.478*) (Table 1). The experience of most PCPs was between 6-10 years, and most were working in non-rural settings. A statistically significant difference with a medium effect was also found using post hoc chi square analysis between the working experience of rural and non-rural PCPs (*χ2 (3) =42.408, p =.027, Cramer's V =.460*) (Table 1). There was no PCPs in a rural setting reported enroll in any post-graduation programs (e.g., Fellow College of Physicians and Surgeons of Pakistan (FCPS), Member College of Physicians and Surgeons of Pakistan (MCPS), Doctor of Medicine *(*MD*),* and Master of Surgery (MS) etc.). All four demographic variables in Table 1 (respondents' gender, age group, working experience, and enrollment in post-graduation) when calculated using chi-square statistics were lower than the level of significance of 0.05 indicating that gender, age group, working experience, and enrollment in post-graduation of rural and non-rural PCPs was significantly different. Therefore, the null hypothesis that there is no difference in the demographic information of rural and non-rural PCPs is statistically rejected.

Table 1. Demographic Information of the respondents

	Rural	Non-Rural	Total	χ^2 value	p-value	Phi Φ	Cramer's V
Gender							
Male	94 (53.4%)	82 (46.6%)	176 (88%)	6.818	.008*	.185	-
Female	6 (25%)	18 (75%)	24 (12%)				
Age Group (Years)							
21-30	29 (61.7%)	18 (38.3%)	47 (23.5%)	45.619	.000*		
31-40	26 (28.9%)	64 (71.1%)	90 (45%)			-	.478
41-50	18 (50%)	18 (50%)	36 (18%)				
51-60	27 (100%)	0 (0%)	27 (13.5%)				
Working Experience (Years)							
<5	31(77.5%)	9(22.5%)	40(20%)	42.408	.027*		
6-10	18(25%)	54(75%)	72(36%)			-	.460
11-15	21(42.9%)	28(57.1%)	49(24.5%)				
>15	30(76.9%)	9(23.1%)	39(19.5%)				
Enrollment in Post-Graduation							
Yes	0 (0%)	27(100%)	27 (13.5%)	31.214	.000*	-.395	-
No	100(57.8%)	73(42.2%)	173(86.5%)				

*The difference is significant at the 0.05 level Phi and Cramer's V effect size: 0.1 small, 0.3 medium, 0.5 large (Cohen, 1988)

Barriers:

Relating to Content

A set of four statements used to measure the responses on barriers relating to content. The mean values of the non-rural group's responses to the four statements ranged from 3.47 to 4.79 indicating that they either "very often" or "always" faced the barriers relating to content (e.g., lack of confidence in the reliability of information content, preferred resources are not available online, etc.) from their practice settings which obstruct their information behavior. The mean scores of the rural group ranged from 2.91 to 3.29 which indicate that rural PCPs faced barriers relating to content "sometimes" (Table 2). The p-value of the 3-items relating to content when calculated using Mann-Whitney U statistics was lower than the alpha value of a 0.05, indicating that barriers relating to content faced by PCPs in rural and non-rural practice settings were significantly different. This difference was statistically measured large in an item of "lack of confidence in the reliability of information content" (*MR*= 60.65 vs 140.35, p= .000, r = 0.73), and medium in two items which are; "preferred resources are not available online" (*MR*= 78.89 vs 122.12, p= .000, r = 0.40), and "doubt about the existence of relevant information" (*MR*= 87.54 vs 113.46, p= .000, r = 0.40) (Table 2). The PCPs in rural settings were more confident over the reliability of sources, they could find online sources, and they were more certain that sources existed.

Relating to Efficiency

All 4-items relating to efficiency (e.g., unsatisfactory past results, it takes too much

time to find the answers of clinical questions, etc.) received mean scores from 3.12 to 3.35 indicating that PCPs in rural settings faced these barriers "sometimes" (Table 2). On the other hand, the mean values of the non-rural group's responses to 4-items ranged from 3.18 to 3.81 indicating that they either "sometimes" or "very often" faced the barriers relating to efficiency. Mann-Whitney U statistics were used to determine any difference among the barriers related to the efficiency between rural and non-rural PCPs. A statistically significant difference with a small effect found in items relating to efficiency i.e. "takes too much time to find the answers of clinical questions" (*MR*= 90.27 vs 110.73, p= .000, r = 0.18), and "unsatisfactory past results" (*MR*= 87.89 vs 113.12, p= .001, r= 0.23) (Table 2). PCPs in rural practice settings were comparatively more efficient to find the answers of clinical questions, they were more satisfied with past results, and they find it easier to ask a clinical question from colleague than to PCPs in non-rural practice setting.

Relating to Skills

The mean values of the rural group's responses to the five questions related to skills (e.g., don't know the website and/or use a computer, etc.) ranged from 2.89 to 3.04 indicating that PCPs in rural settings faced barriers relating to skills "sometimes". On the other hand, the mean values of the non-rural group's responses to five questions ranged from 3.17 to 4.00 indicating that they either "sometimes" or "very often" faced the barriers relating to skills which obstruct their information behavior (Table. 2). Using Mann-Whitney U statistics, a statistically significant difference with a medium effect in an item "don't know how to use online resources very well" (*MR*= 79.69 vs 121.32, p= .000, r= 0.38), and a small effect found in an item "don't know the website and/or use a computer" (*MR*= 82.89 vs 118.12, p= .001, r= 0.23) (Table. 2). PCPs in rural practices were abler to use computers, websites and online resources well than to non-rural.

Relating to Availability

A set of twelve statements were used to measure the responses of PCPs about the barriers regarding the availability of required resources. The mean values of the rural group's responses to the twelve statements ranged from 2.96 to 4.05 indicating that they either "sometimes" or "very often" faced the barriers relating to availability (e.g., no health science librarian, onsite library, lack of access to Internet, etc.) from their practice settings. On the other hand, the mean scores of the non-rural group ranged from 3.53 to 4.36 indicating that they faced these barriers very "often" from their practice settings which obstruct their information behavior to seeking new information (Table 2). The p-value of the seven statements relating to availability when calculated using Mann-Whitney U statistics was lower than the significance level of a 0.05, indicating that the barriers related to availability faced by PCPs in rural and non-rural practice settings were significantly different. A statistically significant difference with medium effect size existed in items i.e. "lack of access to Internet" (*MR*= 82.69 vs 118.31, p= .000, r = 0.32), "lack of technology" (*MR*= 82.49 vs 118.51, p= .000, r = 0.33), "lack of time to update professional knowledge" (*MR*= 74.22 vs 126.79, p= .000, r = 0.47) and lack of training facilities on the use of information resources (*MR*= 75.38 vs 125.63, p= .000, r = 0.45). A statistically significant difference with small effect size found in items which are "no onsite library" (*MR*= 115.50 vs 85.50, p= .000, r = 0.29), "inadequacy of up-to-date medical journals and textbooks" (*MR*= 108.33 vs 92.68, p= .043, r = 0.14), "lack of clinical information support services" (*MR*= 89.68 vs 111.32, p= .006, r = 0.19) (Table. 2). PCPs in rural practice settings had significantly less availability of onsite library, up-to-date medical journals and textbooks than to non-rural PCPs. On the other hand, access to Internet, lack of clinical information support services, lack of technology, lack of time to update professional knowledge, and lack of training facilities on the use of information resources were

comparatively bigger barriers for PCPs in non-rural practice settings than to rural.

Relating to Cost

The Mann-Whitney U Statistics were used to determine any difference among the barriers related to cost between PCPs in rural and non-rural practice settings as measured by their responses to a set of three statements (Table. 2). The mean values of the rural group's responses to the three statements ranged from 2.89 to 3.11 indicating that they "sometimes" faced the barriers relating to cost. On the other hand, mean scores of the non-rural group's ranged from 3.37 to 3.62 indicating that either "sometimes" or "very often" faced the barriers relating to cost. The p-value of the two statements relating to cost when calculated using Mann-Whitney U statistics was lower than the significance level of a 0.05, indicating that barriers relating to cost faced by PCPs in rural and non-rural practice settings were significantly different. A statistically significant difference with small and medium effect size found respectively in items which are "computers are too expensive for clinical practice" (*MR*= 85.00 vs 116.01, p= .000, r = 0.27) and "online resources are too expensive" (*MR*= 83.74 vs 117.27, p= .000, r = 0.30). Cost was a bigger barrier for PCPs in non-rural settings than to rural.

In order to test the hypothesis II, we computed PCPs' responses to each statement into sum using SPSS. Using Mann-Whitney U test, a statistically significant difference found among the barriers faced by PCPs in rural and non-rural practice settings. We measured a medium effect size in the barriers related to content (*MR*= 74.47 vs 126.54, *U*= 2396.5, p= .000, r = 0.45), and a small effect in the barriers related to efficiency (*MR*= 91.92 vs 109.09, *U*=4141.5, p= .035, r = 0.14), skills (*MR*= 88.85 vs 112.15, *U*= 3835.0, p = 0.004, r = 0.20), availability (*MR*= 90.87 vs 110.13, *U*= 4037.0, p= .018, r = 0.26), and cost (*MR*= 87.48 vs 113.53, *U*= 3697.5, p= .001, r = 0.22). The p-value of all the five variables (content, availability, skills, efficiency, and cost) is lower than the level of significance of 0.05, which indicates that the barriers faced by PCPs in rural and non-rural practice setting was significant difference. Therefore, the null hypothesis that there is no difference among the barriers related to content, availability, skills, efficiency, and cost faced by PCPs in a rural and non-rural practice setting is statistically rejected. PCPs in non-rural settings faced significantly greater barriers than rural settings.

Table-2 Barriers faced by rural and non-rural PCPs while seeking health information from their practice settings

	Descriptive Analysis				Inferential Analysis (Mann-Whitney U)				
	Rural (n=100)		Non-Rural (n=100)		Rural (n=100)	Non-Rural (n=100)			
Barriers	Mean	Std. Dev.	Mean	Std. Dev.	Mean Rank	Mean Rank	Mann-Whitney U	p-value	Effect Size (r)
Relating to Content									
Lack of confidence in the reliability of information content	2.91	1.37	4.79	.48	60.65	140.35	1015.000	.000*	0.73
Preferred resources are not available online	3.29	1.31	4.26	.46	78.89	122.12	2838.500	.000*	0.40
Doubt about the existence of relevant information	3.07	1.26	3.62	.66	87.54	113.46	3704.000	.001*	0.02
No access to full text once references are identified	3.12	1.36	3.47	1.09	93.15	107.85	4265.000	.060	0.13
Relating to Efficiency									
Takes too much time to find the answers of clinical questions	3.35	1.25	3.81	.58	90.27	110.73	3977.000	.008*	0.18
Unsatisfactory past results	3.22	1.28	3.73	.62	87.89	113.12	3738.500	.001*	0.23
Easier to ask a colleague	3.12	1.26	3.36	.98	97.57	103.43	4707.000	.457	0.05
Geographic isolation	3.84	1.15	3.18	1.11	100.56	100.44	4994.000	.988	0.001

Relating to Skills									
Don't know how to use online resources very well	2.89	1.53	4.00	.74	79.69	121.32	2918.500	.000*	0.38
Don't know the website and/or use a computer	2.94	1.50	3.89	.92	82.89	118.12	3238.500	.000*	0.03
Uncertainty about where to look for information	2.96	1.37	3.36	.77	94.19	106.81	4369.000	.106	0.11
Don't know how/where to start searching for answers	2.96	1.46	3.17	.84	98.98	102.02	4848.000	.699	0.02
Difficult to articulate questions using an online resource	3.04	1.38	3.26	.76	98.39	102.61	4789.000	.586	0.03
Relating to Availability									
No onsite library	4.04	1.36	3.48	.76	115.50	85.50	3500.000	.000*	0.29
No onsite health sciences librarian	4.17	.73	3.95	1.39	102.62	98.39	4788.500	.581	0.03
Lack of access to Internet	3.47	1.39	4.36	.64	82.69	118.31	3219.000	.000*	0.32
Computer is not readily available when I need it	3.59	1.46	3.90	.67	99.96	101.04	4946.000	.890	0.009
Non availability of clinical information system	3.62	1.37	3.53	.80	107.76	93.25	4274.500	.063	0.13
Inadequacy of up-to-date medical journals & textbooks	3.62	1.26	3.55	.78	108.33	92.68	4217.500	.043*	0.14

Inadequacy of health information resources	3.65	1.18	3.82	.94	98.38	102.63	4787.500	.586	0.03
Lack of clinical information support services	3.56	1.14	4.00	.95	89.68	111.32	3918.000	.006*	0.19
Non-availability of document delivery services	3.62	1.11	3.82	1.03	95.00	106.00	4450.000	.159	0.09
Lack of technology	4.05	4.37	4.27	1.14	82.49	118.51	3199.000	.000*	0.33
Lack of time to update professional knowledge	2.96	1.36	4.17	.73	74.22	126.79	2371.500	.000*	0.47
Lack of training facilities on the use of information resources	3.23	1.24	4.27	.62	75.38	125.63	2487.500	.000*	0.45
Relating to Cost									
Computers are too expensive for clinical practice	2.89	1.37	3.62	1.08	85.00	116.01	3449.500	.000*	0.27
Online resources are too expensive	3.11	1.30	3.91	.67	83.74	117.27	3323.500	.000*	0.30
Searching cost/ cost of document	3.11	1.39	3.37	1.07	97.40	103.61	4689.500	.430	0.05

*The difference is significant at the 0.05 level

Scale: 5=Always, 4=Very Often, 3= Sometimes, 2=Rarely, 1= Never

Phi and Cramer's V effect size: 0.1 small, 0.3 medium, 0.5 large (Cohen, 1988)

($r = Z / \sqrt{N}$).

Primary Care Physicians' Age and Perceived Barriers to Health Information

The one-way ANOVA statistic was applied to assess any difference between primary care physicians' age (which has four independent groups of ages: (i) 21-30 years, (ii) 31-40 years, (iii) 41-50 years, and (iv) 51-60 years) and perceived barriers to health information seeking from their practices. The analysis of variance showed that age was a statistically significant factor with medium effect as to PCPs perceived the barriers related to content $F(3, 196) = 6.891$, $p = .000$, ηp2 = .309, efficiency, and cost with small effect respectively $F(3, 196) = 5.681$, $p = .001$, ηp2 = .283, and $F(3, 196) = 5.174$, $p = .002$, ηp2 = 2.71. PCPs in the age group between 31-40 years perceived the greatest, and 51-60 years the lowest, the barriers related to content of the information. However, PCPs in a category of 25-30 years perceived the greatest, and between 51-60 years the lowest, barriers related to cost of the information. There was no statistically difference found among a PCP's age, their perceived barriers to skills F (3, 196) = .201, $p = .896$, ηp2 = .055, and the availability of information sources F (3, 196) = 2.431, $p = .066$, ηp2 = .189.

Primary Care Physicians' Working Experiences and Perceived Barriers to Health Information

The one-way ANOVA statistic was applied to assess any difference between PCPs working experiences (which has four independent groups: < 5 years, 6-10 years, 11-15 years, and >15 years) and perceived the barriers to seeking health information from rural and non-rural practice settings. The analysis of variance showed that working experience was a statistically significant factor with small effect as to PCPs perceived barriers related to content F (3, 196) = 3.586, $p = .015$, ηp2 = .228, and availability F (3, 196) = 3.134, $p = .027$, ηp2 = .214. PCPs in a group between 6-10 years of working experience perceived the greatest and a group of > 15-years of experience the lowest barriers relating to content of the information. Whereas, PCPs in a group of working experience between 11-15 years perceived the greatest and a group of > 15-years of experience the lowest barriers related to the availability of the health information sources. There was no difference found between a PCP's working experience and their perceived barriers to efficiency $F(3, 196) = 2.635$, $p = .051$, ηp2 = .197, skills $F(3, 196) = 2.241$, $p = .085$, ηp2 = .182, and cost of the information sources $F(3, 196) = 2.502$, $p = .061$, ηp2 = .192.

Discussion

The findings of this study showed that PCPs in a non-rural setting faced significantly greater barriers (relating to information content, efficiency, skills, availability, and cost) than PCPs in a rural setting. In contrast, earlier studies conducted elsewhere reported that PCPs in rural practices have additional barriers in comparison with the ones found in non-rural in seeking health information (e.g., Dorsch, 2000; & Perera, 2009, etc). These barriers were related to the lack of clinical information system, non-availability of document delivery services, poor ICT infrastructure, and inadequate access to Internet (e.g., Naeem & Bhatti, 2015; Dorsch, 2000; Bennett, *et al*., 2004; Coumou, 2006; Rural Health Research & Policy Center, 2009, etc). A few other studies have reported some additional barriers which were also associated with rural practices, i.e., solo practice, and doubt about the credibility of the information sources (e.g., Ely, *et al*., 2002; Walsh & Bukachi, 2009; Kiani, *et al*., 2013; Andualem, *et al*., 2013, etc.). However, the results of the present study confirm the findings of other studies conducted previously and assert that the physicians in a rural practice setting are likely to have less availability of medical library, and health sciences librarian than the physicians working in a non-rural setting (Coumou, 2006; Nail-Chiwetalu & Rathner, 2007). Non-availability of medical libraries and the services of a medical librarian are taken as a major drawback that instantly obstructs rural PCPs' access to reliable health information sources (Naeem *et al.,* 2013b). Geographic isolation is another reason which obstructs rural PCPs

access to new health information resources (Hulkonen, 1986; & Bowden, 1994).

There are many reasons for opposite findings of this study if seen in comparison with the findings of the studies conducted previously. The one reason would probably be the growth of health sciences libraries, which is only limited and undergoing in tertiary care hospitals (tertiary care hospitals have a status of teaching hospitals as well, having a health sciences library with a professional librarian in a teaching hospital is a prerequisite by a recognition and accreditation authority e.g., Pakistan Medical and Dental Council). However, a health sciences library or librarian does not exist in secondary and primary health care facilities. There are also no outreach health information or document delivery services available for physicians of primary and secondary care health facilities. The non-rural PCPs recruited in this study were either working in a tertiary care hospital or secondary health care facilities, which were either situated in bigger cities or far from 10-miles from bigger cities or towns. Therefore, they are more likely to have health information literate than rural PCPs working in basic or secondary health units or facilities, which were situated at a distance of at least 10-miles from a population center of 30,000 or more. Whereas apparently, they had no opportunity of information literacy programs (as they are not being served by health science librarian or library), post-graduation or continuing medical educational facilities, and the assistance of seniors (as they mostly work in a solo practice setting) in their practice setting. It can be argued that a physician with literacy skills regarding health information will be more eager to access great amount of health information resources than a physician having no information and literacy skills. It is because health information literacy likely to leads the physician toward an increased awareness of health information resources, and in this way an information literate person can recognize a need for further information. The need to access health information in order to fill a gap in knowledge in poor information-resource setting is likely to be an approach that will lead towards greater barriers to health information. Out of two groups (rural and non-rural); the non-rural PCPs need additional information resources for their continuing medical education (e.g., to cover the syllabus, writing a research synopsis, dissertation, preparation for a written and verbal exam, etc.) as overwhelming 27% of the non-rural PCPs were registered in postgraduate courses (FCPS, MCPS, MS, MD, DCH, etc.). However, the rural PCPs were only involved in a routine limited day-to-day clinical practice (where they required health information occasionally) as none of them was registered in any continuing medical education course.

Unevenly age distributions of PCPs in rural and non-rural practices were another reason for opposite results found in this study (although the distribution of age represents the true population). The results of this study showed that age was a significant factor as PCPs perceived it as one of the barriers to health information. PCPs with older age perceived the lowest barrier to health information. In our cohort, 27% percent of rural PCPs were in the age group of 51 to 60 years; which is the oldest age group in our study. PCPs of this group perceived the lowest barriers (this was also reflected in the years of experience, PCPs with less experience faced the greater barriers and with high experience the fewer barriers). However, no PCPs from a non-rural practice setting reported in this oldest age group. The rural PCPs with the oldest age group were serving in the last part of their careers and were about to retire from their services in the time span of a few-year. There is a common perception that ICT usage is an age-related phenomenon, a study conducted by (Findahl, 2012) confirms that ICT usage is decreasing with advancing age. Therefore, it could be possible that rural PCPs are more likely to rely on their own knowledge and experiences rather than consulting the available information resources online for patient care could be another reason the rural PCPs reported that they encountered fewer barriers than the ones faced by the non-

rural PCPs. According to the findings of this study the majority of the PCPs in non-rural setting reported that the use of computer and online information sources are too expensive in their day-to-day clinical practice. As the attitude of a physician towards information technology is considered as an important element in adopting ICT tools for information seeking (Ward, et al., 2008), physicians are gradually adopting ICT tools as a median to extend their services to patients and to keep up with the latest information resources. In a poor information-resource setting, mobile phone devices are acknowledged as a useful source for seeking online health information. The smart phones and personal digital assistant (PDAs) devices have provided an opportunity for physicians to seek online health information from their practice setting (De- Buenaga, *et al.,* 2008; & Gavino, *et al.,* 2013). The ICT have not only addressed the barrier of information explosion in the field of medicine but also helped physicians to access online information resources from their practice setting at the hour of its need to provide better patient's care. Overall, the differences among PCPs' age, working experiences, and the enrollment in post-graduation were most likely the variables that have contributed in producing the contrast results of this studyif seen in comparison with the results of studies conducted previously.

Implications

In order to plan or design effective health information system or outreach services to PCPs for the provision of equitable access to rural and non-rural PCPs, it is important that we should see both groups (rural and non-rural) as a separate entity; this is due to the variations found between the characteristics of rural and non-rural PCPs and their practice settings. The results of this study will be useful for health sciences professionals, librarians, and professional associations, ICT-cell of Health Department of Government of Punjab, and policy makers to understand the barriers the two groups of rural and non-rural PCPs encounter in their practices while seeking health information. This would help them to focus a group with greater barriers.

Limitations

We used survey method to gather data for the present study, which has its known limitations. Another limitation of the study is that the study was delimited to the population of one district; therefore, care should be exercised while generalizing the results of this study to other districts. Other limitations of this study are; the barriers to health information faced by rural and non-rural PCPCs. To yield more conclusive results, a mixed methods study; combing observation or interview schedule with survey was conducted.

The study was delimited to seeking health information from online sources from rural and non-rural practice settings (health facilities). The barriers studied were only relating to content, efficiency, skills, availability, and cost of the health information sources. Therefore, the results of this study should not be generalized with regard to print information sources during the process of seeking health information from home or other places. However, care should be exercised in generalizing the results of this study to other barriers i.e. the barriers related to ICT infrastructure and information literacy skills, which have not been covered in the present study.

Although, the information needs and desires of both groups (rural and non-rural) have not been studied, yet it is assumed that a group having maximum numbers of respondents enrolled in continuing medical education is likely to need a greater amount of information resources than other group has. Similarly, the information literacy has also not been studied, but it is assumed that PCPs work in a setting where they have a facility of health sciences library and a librarian is likely to have more information literate than the other.

The study recommends a comparative study on rural and non-rural PCPs' information literacy skills, which will help in knowing the information literacy of the two groups, and could assist

health sciences librarians, and professionals associations in launching educational activities in order to enhance the awareness to health information resources and services, and also information literacy skills. Similarly, another study needs to be conducted on the evaluation of ICT infrastructure in rural and non-rural practice setting. Both studies are important in order to determine the broader prospective of barriers to health information which obstruct information behavior of PCPs.

The present study identifies the potential role of health sciences librarians in Pakistan to address the barriers PCPs encounter while seeking health information. The study also identifies the need to enhance the information finding, searching, and seeking skills of the physicians by organizing training sessions on information literacy skills. The study recommends a need for planning and designing outreach health information services for PCPs in both rural and non-rural settings (where health sciences library and the services of a librarian are not available) by carefully assessing the information needs and seeking the behaviors of both groups.

Conclusion

This study concluded that primary care physicians (PCPs) of a non-rural practice setting faced greater barriers than rural while seeking health information from their health facilities. Age and working experience of the PCPs are significant factors which were perceived by PCPs as the barriers to health information.

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