

Received 2020-07-28
Revised 2020-08-18
Accepted 2020-08-28

Health-Related Quality of Life in End-Stage Renal Disease Patients and Healthy Individuals

Niyan Hakeem Ismael ¹, Aso Omer Rashid ²✉

¹ Faculty of Medical Sciences, College of Nursing, University of Sulaimani, Urological Department, Sulaymaniyah, Iraq

² Faculty of Medical Sciences, College of Medicine, University of Sulaimani Urological Department, Sulaymaniyah, Iraq

Abstract

Background: Health-related quality of life (HRQOL) is an important outcome measure in patients with end-stage renal disease (ESRD). HRQOL is assumed to improve with kidney transplantation and compared to hemodialysis. However, there is no evidence regarding HRQOL to support the optimal treatment choice for patients on hemodialysis who hesitate opting for transplantation. Therefore, this study aims to compare HRQOL between patients with ESRD and healthy individuals. **Materials and Methods:** This case-control study was performed of 50 patients with ESRD under hemodialysis and 100 healthy participants as controls. HRQOL was assessed using the SF-36 questionnaire. Data was analyzed by using linear regression to compare HRQOL between groups, and adjusted for age, gender, dialysis duration. **Results:** Most of the patients were males (62%) and aged 21 to 60 years old (82%). The patients and healthy subjects were significantly different in terms of the presence of chronic diseases ($P < 0.05$). ESRD patients had a significantly lower level of satisfaction with health and function, family and friends, and social and psychological functions. The patients' quality of life was not significantly affected by their demographic characteristics, including age, gender, educational level, marital status, and financial status. However, there was a significant association between chronic disease and HRQOL among ESRD ($P = 0.0001$). **Conclusion:** ESRD has a remarkably negative effect on the patients' quality of life and satisfaction with important domains of life. HRQOL among patients with end-stage renal disease can be affected by the associated chronic diseases. [GMJ.2020;9:e1987] DOI: [10.31661/gmj.v9i0.1987](https://doi.org/10.31661/gmj.v9i0.1987)

Keywords: End-Stage Renal Disease; Health-Related Quality of Life; Kidney Transplantation; Chronic Disease

Introduction

Health-related quality of life (HRQOL) is an important indicator of well-being in patients with end-stage renal disease (ESRD) and is associated with survival and clinical outcomes

[1–4]. Compared to the general population, patients with ESRD have severely diminished HRQOL, by some needed even lower than in diseases such as congestive heart failure, chronic lung disease and/or cancer [5]. The preferred treatment for ESRD is kidney

GMJ

Copyright© 2020, Galen Medical Journal. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>)
Email: info@gmj.ir



✉ Correspondence to:

Aso Omer Rashid, Assistant Lecturer, PhD. Faculty of Medical Sciences, College of Nursing, University of Sulaimani, Urological department, Sulaymaniyah, Iraq
Telephone Number: 00964(0)7701930039
Email Address: niyan.ismael@univsul.edu.iq

transplantation, which is associated with improved HRQOL and survival [6]. However, because of the limited availability of donor kidneys and because of transplant failure, many patients have to remain on dialysis. An alternative to conventional dialysis modalities is frequent nocturnal hemodialysis. With this treatment, patients dialyze almost daily and twice as long (7–8 hours), generally at home. Thus, this treatment removes fluid more slowly and clears more solutes such as urea and phosphate [7]. Worldwide, it is estimated about 200 million people have chronic kidney disease (CKD), and correspondence to the burden of CKD continues to increase in low-to middle-level income countries globally [8]. The annual mortality rate of CKD was 14.8%–15.7% in the United States between 2006 and 2008 [9]. While ESRD, which is more devastating medical, social, and economic problem, needs more supervision and medical cares. It is associated with 1-year mortality of 23.5% in the USA with the cardiac causes consist of 50% of all deaths [10,11]. Globally, more than one million people die annually from ESRD [8]. Instead of traditional endpoints assessment for the effect of interventions on patients, the quality of life (QoL) measures have become increasingly used in the recent decades with changing the pattern of illness in developed and developing countries [12,13]. Traditional morality based measures present information about the lowest levels of health only. However, they reveal little about the critical aspects of health and well-being [14]. On the other hand, the different domains of HRQOL that measure the state of well-being, including the perception of general health in three dimensions of physical, psychological, and social states that is primary interested as an indicator of the efficacy of receiving therapeutic cares [15]. In the management of patients of ESRD, although the progress has been achieved in therapeutic agents. Using dialysis process in passing off superfluous, the longevity of patients has been increased, but several metabolic complications threaten the HRQOL. Thus, the limitations would arise in different aspects of daily activities. Many of these patients are unable to cope with possible limitations; therefore: the psychological along with physical and social problems could affect

their health states [16, 17].

Materials and Methods

This case-control study was performed of 50 patients with ESRD under hemodialysis and 100 healthy participants as controls. The patients were recruited from the dialysis center of Shar Hospital in Sulaimani city. The inclusion criteria were the ESRD with at least three months duration of dialysis and aged 20–80 years. The controls were selected from healthy participants of patients' visitors or outpatients clinic. In control selection, participants with debilitating conditions such as diabetes, renal failure, history, cardiovascular disease, heart surgery, cancers, dementia, overt disability, and congenital disorders were excluded. Additionally, those who lost their close relatives within the previous six months were also excluded from control selection. For each case, two gender and age-matched controls were selected from patients' visitors or outpatient clinics of the hospital. The demographic data were collected using face to face interviews conducted, and SF-36, standard questionnaire of HRQOL, was used. The validity and reliability of this questionnaire were assessed in several reports. This questionnaire included 36 items that assess the HRQOL in five dimensions. In each dimension, the score of items was transformed as a subscale from 1 (worse health) to 6 (best health). Also, the internal consistency of items within each subscale was evaluated by the reliability coefficient for rating data. The duration of dialysis and demographic data such as age, gender, marital status, educational level, and residence area were collected.

Statistical Analysis

Statistical analysis was used by Statistical Program for Social Sciences (SPSS) software version 21 (IBM Corp. Released 2013, Armonk, New York, USA) and data presented as mean \pm standard deviation (SD). The overall QoL as weighted QoL of specific subscales were calculated according to case status, gender, age group, educational level. Also, Mann–Whitney and Kruskal–Wallis tests were used to avoid any distributional assumption in comparison of QoL between cases and

healthy participants. In addition, the multiple linear regression models were applied to adjust the effect of possible potential confounding factors such as age, gender, educational level, marital status, residence area, and various dimensions of QoL. The adjusted regression coefficients of multiple linear regressions show the adjusted mean difference between groups of binary predictor factors that entered into the model. The $P < 0.05$ was considered statistically significant.

Results

The mean age was 41.03 ± 15.004 years, and most of the participants in both case and control groups belonged to the age groups 21-40 and 41-60 years (82% of the cases and 86% of the controls). Regarding their gender, most of the case (62%) and control (60%) were males. In terms of their education level, almost equal percentages of the cases and controls were illiterate (28% vs. 22%) or finished primary school (28% vs. 25%), secondary school (26% vs. 30%), and institute or college (18% vs. 23%). Regarding their marital status, most of the case (66%) and control (72%) groups were married. With regard to their financial status, most of the cases (62%) and controls (61%) had barely sufficient financial status. The cases and control were not significantly different in terms of the abovementioned demographic characteristics; therefore, they were homogeneous in terms of their demographics. With regard to having chronic diseases, there was a significant difference between the cases and controls ($P = 0.0001$), such that most of the cases (88%) had chronic disease, while more than half of the controls (57%) did not (Table-1). Comparing the cases and controls regarding different important domains and satisfaction with them, the results showed that the two groups were significantly different in terms of their health and functioning, family and friends, social life, and psychological/spiritual state and their satisfaction with such domains ($P = 0.0001$). These results demonstrated that the level of satisfaction with these domains was significantly higher in the controls compared to the cases (Table-2). The control participants were remarkably more satisfied than the ESRD patients with their

health and functioning (44% vs. 66%), family (43% vs. 69%), social and economic status (45% vs. 63%), and psychological and spiritual functioning (52% vs. 70%). Moreover, the overall satisfaction in the case and the control group was 46% and 67%, respectively. Data showed means scores of QoL domains of two groups were significantly different regarding health and functioning, family, social functioning, and psychological functioning ($P = 0.0001$, Table-3). Regarding the relationship between the patients' demographic characteristics and their overall QoL, the re-

Table 1. Socio-Demographic Data of Participants

Characteristics	Case group		Control group		P-value
	n	%	n	%	
Age group, y					
≤ 20	5	10	4	4	0.366
21 - 40	20	40	50	50	
41 - 60	21	42	36	36	
>60	4	8	10	10	
Gender					
Female	19	38	40	40	0.813
Male	31	62	60	60	
Education levels					
Illiterate	14	28	22	22	0.755
Primary school	14	28	25	25	
Secondary school	13	26	30	30	
Institute or college	9	18	23	23	
Marital status					
Single	13	26	21	21	0.747
Married	33	66	72	72	
Widowed/separated	4	8	7	7	
Financial status					
Sufficient	2	4	4	4	0.993
Barely sufficient	31	62	61	61	
Insufficient	17	34	35	35	
Chronic disease					
No	6	12	57	57	0.0001
Yes	44	88	43	43	

sults showed that there was not significantly correlated with their age (P=0.437), gender (P=0.84), educational level (P=0.16), marital status (P=0.91), and financial status (P=0.18). However, a highly significant correlation was observed between their overall QoL and the presence of chronic diseases (P=0.0001, Table-4).

Discussion

Patients with ESRD are usually at a high risk of poor survival and adverse clinical outcomes, causing their HRQOL to undergo a remarkable decrease [3-5]. In this regard, the present study was carried out in order to compare the demographic characteristics and different domains of QoL in patients with ESRD to take into account those parameters and come up with a higher QoL among such patients. The results demonstrated that most of the ESRD patients aged between 21 and 60 years. Almost in line with this finding, Hoch-

man *et al.* studied prevalence and incidence of ESRD in patients ≥ 18 years, reported that ESRD was more prevalent among individuals over the age of 45 years compared to those below this age [19]. Moreover, as shown by the results, ESRD was more prevalent among male patients. In line with this finding, Stats *et al.* pointed out that men were more likely (64%) to develop ESRD than women [20]. As revealed by the results of the current study, the patients with ESRD were not significantly different in terms of parameters such as age, gender, education level, marital status, and financial status. Therefore, none of these can be considered as significantly decisive risk factors for ESRD; however, it was observed that a larger number of male and older age individuals developed ESRD, such that ESRD was observed in 62% of males, while 38% of the females had it. Also, individuals aged between 21-60 years were more afflicted by the disease than younger ones. In line with our study, other studies have shown that older age and

Table 2. Distribution of the Mean Scores of Participants' Satisfaction and Important Domains

HRQPL	Case group		Control group		P-value
	Mean	SD	Mean	SD	
Satisfactions domains					
Health and functioning	44.40	10.12	65.35	6.11	0.0001
Family and friend	44.40	14.97	70.27	8.47	0.0001
Social	45.92	11.02	62.04	6.79	0.0001
Psychological / spiritual	53.71	8.54	71.00	5.39	0.0001
Total important	47.11	9.41	67.16	5.05	0.0001
Important domains					
Health and functioning	43.83	9.55	66.00	4.99	0.0001
Family and friend	42.27	12.57	66.73	7.99	0.0001
Social	45.17	9.78	63.38	9.78	0.0001
Psychological / spiritual	50.33	8.09	69.090	6.01	0.0001
Total important	45.40	8.75	66.50	4.54	0.0001

Table 3. Distribution of Differences in Mean Scores of QoL Domains in Case and Control Groups

Variables	Mean	Std. Error	95% CI		P-value
			Lower	Upper	
Health functioning	-21.22	1.155	-23.50	-18.94	0.0001
Family	-25.167	1.517	-28.17	-22.17	0.0001
Social	-18.10	1.271	-20.62	-15.59	0.0001
QoL psychological	-18.43	0.975	-20.36	-16.50	0.0001
QoL overall	-20.73	1.031	-22.77	-18.69	0.0001

male sex are risk factors for ESRD [21-23]. Our results indicated that patients with ESRD were significantly different from healthy individuals in terms of having the chronic disease. This finding is in good agreement with the results of the studies carried out by Wu *et al.* (2018) and Narres *et al.* (2016) that pointed out that there were a significant association between the presence of ESRD and developing diabetes [24, 25]. Similarly, Alalawi *et al.* have also reported that 57% and 12.4% of the ESRD cases resulted from diabetic nephropathy and hypertension, respectively [26]. It has also been reported that anxiety and depression are associated with ESRD [27]. The healthy subjects were compared with the patients with ESRD in terms of their important domains of

life and their satisfaction with them. These domains included health and functioning, family and friends, social functioning, and psychological and spiritual functioning. The results revealed that the two groups were significantly different in all these domains. In other words, it was observed that the ESRD patients had remarkably lower levels of satisfaction with these important domains of their lives, indicating that they had a lower level of QoL significantly. In line with these findings, Kutner *et al.* reported that patients with ESRD have a high level of functional impairment [28]. Also, Gerogianni *et al.* (2016) stated that ESRD patients who had undergone hemodialysis were less satisfied with their relationships with their family and friends, such that they felt they were a burden to them [29]. The results regarding the low satisfaction of the patients with their social functioning and mental/spiritual functioning have been supported by the study carried out by Rostami *et al.* that reported a poor level of social and mental functioning in ESRD patients undergoing hemodialysis [30]. In this regard, studies have suggested that social and familial support can raise the overall quality of life in patients with ESRD [31, 32]. The relationship between the ESRD patients' demographics and their overall QoL was compared, and the results showed that none of the demographic characteristics (i.e., age, gender, educational level, marital status, and financial status) was significantly associated with their overall QoL. Despite insignificant relationship between overall QoL and age, it was noticed that the ESRD patients' overall QoL dropped with increasing age, such that patients under the age of 20 years had the highest overall QoL, while those aged over 60 years had the lowest. In line with this result, Cruz *et al.* concluded that QoL was remarkably lower in older ESRD patients, particularly regarding their physical functioning [33]. The patients' gender has no significant effect on their overall QoL. In this regard, the literature has revealed contradictory results. For example, Rostami *et al.* stated that QoL was better in men than women [30], while Bayoumi *et al.* reported that women had a higher level of QoL than men [34]. However, Peng *et al.* have claimed that since women undergo deeper psychological disorders as

Table 4. Distribution of Differences in Mean Scores of QoL According to Patients' Characteristics

Characteristics	Overall QoL (Mean \pm SD)	P-value
Age group, y		
≤ 20	51.0 \pm 9.6	0.437
21- 40	44.6 \pm 9.3	
41- 60	46.8 \pm 8.1	
> 60	43.8 \pm 1.9	
Gender		
Female	45.8 \pm 6.3	0.84
Male	46.3 \pm 9.7	
Educational level		
Illiterate	41.9 \pm 3.8	0.16
Primary school	46.9 \pm 9.9	
Secondary school	47.7 \pm 6.9	
Institute or college	49.1 \pm 11.8	
Marital status		
Single	46.7 \pm 12.5	0.91
Married	46.1 \pm 7.1	
Divorced	44.6 \pm 2.3	
Financial status		
Sufficient	44.5 \pm 2.7	0.18
Barely sufficient	47.8 \pm 9.8	
Insufficient	43.2 \pm 4.8	
Chronic disease		
No	61.9 \pm 11.9	0.0001
Yes	43.9 \pm 5.1	

a result of ESRD, they have a lower level of overall QoL [35]. In line with the results of the present study, Zhou *et al.* reported that factors like financial status, marital status, and dialysis methods have no significant effect on scores of QoL [36]. According to the results of the present study, the chronic diseases associated with ESRD had a significant effect on the patients' overall QoL. Chronic diseases, no matter what other diseases they are associated with, have been reported to have a remarkable effect on the patients' quality of life. This finding is in line with the results of the study carried out by Megari. reported confirmed that chronic diseases remarkably affect the patients' QoL; therefore, nurses and social workers are highly recommended to provide such patients with sufficient support in order to enhance their HRQOL [37]. Similar findings have also been reported by Pengpid and

Peltzer [38].

Conclusion

ESRD can affect both genders and all age groups; however, it is more prevalent among males and older-age patients. HRQOL among ESRD patients can be negatively affected by both the disease itself and others associated with chronic diseases. ESRD patients have a low level of satisfaction with health and functioning, family and friends, social functioning, and psychological functioning. QoL in ESRD patients was not significantly affected by their demographic characteristics.

Conflict of Interest

Authors declare there was no conflict of interest.

References

1. Lacson E Jr., Xu J, Lin SF, Dean SG, Lazarus JM, Hakim RM. A comparison of SF-36 and SF-12 composite scores and subsequent hospitalization and mortality risks in long-term dialysis patients. *Clin J Am Soc Nephrol.* 2010; 5(2):252–60.
2. Mapes DL, Lopes AA, Satayathum S, McCullough KP, Goodkin DA, Locatelli F, et al. Health-related quality of life as a predictor of mortality and hospitalization: the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Kidney Int.* 2003; 64(1):339–49.
3. Lowrie EG, Curtin RB, LePain N, Schatell D. Medical outcomes study short form-36: a consistent and powerful predictor of morbidity and mortality in dialysis patients. *Am J Kidney Dis.* 2003; 41(6):1286–92.
4. Kalantar-Zadeh K, Kopple JD, Block G, Humphreys MH. Association among SF36 quality of life measures and nutrition, hospitalization, and mortality in hemodialysis. *J Am Soc Nephrol.* 2001; 12(12):2797–806.
5. Mittal SK, Ahern L, Flaster E, Maesaka JK, Fishbane S. Self-assessed physical and mental function of haemodialysis patients. *Nephrol Dial Transplant.* 2001; 16(7):1387–94.
6. Tonelli M, Wiebe N, Knoll G, Bello A, Browne S, Jadhav D, et al. Systematic review: kidney transplantation compared with dialysis in clinically relevant outcomes. *AmJTransplant.* 2011; 11(10):2093–109.
7. Pierratos A, Ouwendyk M, Francoeur R, Vas S, Raj DS, Ecclestone AM, et al. Nocturnal hemodialysis: three-year experience. *J Am Soc Nephrol.* 1998; 9(5):859–68.
8. Ojo A. Addressing the global burden of chronic kidney disease through clinical and translational research. *Trans Am Clin Climatol Assoc.* 2014;125:229-43.
9. Cheng X, Nayyar S, Wang M, et al. Mortality rates among prevalent hemodialysis patients in Beijing: A comparison with USRDS data. *Nephrol Dial Transplant.* 2013;28:724-32.
10. Elsharif ME. Mortality rate of patients with end-stage renal disease on regular hemodialysis: A single center study. *Saudi J Kidney Dis Transpl.* 2011;22:594-6.
11. Wallen MD, Radhakrishnan J, Appel G, Hodgson ME, Pablos-Mendez A. An analysis of cardiac mortality in patients with new-onset end-stage renal disease in New York State. *Clin Nephrol.* 2001;55:101-8.
12. Valderrábano F, Jofre R, López-Gómez JM. Quality of life in end-stage renal disease patients. *Am J Kidney Dis.* 2001;38:443-64.

13. Wu AW, Fink NE, Cagney KA, et al. Developing a health-related quality-of-life measure for end-stage renal disease: The CHOICE Health Experience Questionnaire. *Am J Kidney Dis.* 2001;37:11-21.
14. Centers for Disease Control and Prevention. Measuring healthy days: Population assessment of health related quality of life. Atlanta, Georgia: US Department of Health and Human Services, National Centers for Disease Prevention and Health Promotion, Division of Adult and Community Health, CDC; 2000. p. 4-9.
15. Ware JE Jr, Gandek B. Overview of the SF-36 health survey and the international quality of life assessment (IQOLA) project. *J Clin Epidemiol.* 2000;51:903-12.
16. Pagels AA, Söderkvist BK, Medin C, Hylander B, Heiwe S. Health-related quality of life in different stages of chronic kidney disease and at initiation of dialysis treatment. *Health Qual Life Outcomes.* 2012;10:71.
17. Spiegel BM, Melmed G, Robbins S, Esrailian E. Biomarkers and health-related quality of life in end-stage renal disease: A systematic review. *Clin J Am Soc Nephrol.* 2008;3:1759-68.
18. Mapes DL, Bragg-Gresham JL, Bommer J, et al. Health-related quality of life in the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Am J Kidney Dis.* 2004;44 5 Suppl 2:54-60.
19. Hochman ME, Watt JP, Reid R, O'Brien KL. The prevalence and incidence of end-stage renal disease in Native American adults on the Navajo reservation. *Kidney Int.* 2007; 71:931-937.
20. Stats F. National chronic kidney disease fact sheet, 2017. US Department of Health and Human Services, Centers for Disease Control and Prevention; 2017.
21. Ishani A, Grandits GA, Grimm RH, et al. Association of single measurements of dipstick proteinuria, estimated glomerular filtration rate, and hematocrit with 25-year incidence of end-stage renal disease in the multiple risk factor intervention trial. *J Am Soc Nephrol.* 2006;17(5):1444-1452.
22. US Renal Data System 2007 annual data report. Retrieved on July 25, 2019 from: http://www.usrds.org/2007/pdf/02_incid_prev_07.pdf.
23. Hsu CY, Iribarren C, McCulloch CE, Darbinian J, Go AS. Risk factors for end-stage renal disease: 25-year follow-up. *Arch Intern Med.* 2009;169(4):342-350.
24. Wu PP, Kor CT, Hsieh MC, Hsieh YP. Association between End-Stage Renal Disease and Incident Diabetes Mellitus-A Nationwide Population-Based Cohort Study. *J Clin Med.* 2018;7(10):343.
25. Narres M, Claessen H, Droste S, et al. The Incidence of End-Stage Renal Disease in the Diabetic (Compared to the Non-Diabetic) Population: A Systematic Review. *PLoS One.* 2016;11(1):e0147329.
26. Alalawi F, Ahmed M, AlNour H, Noralla M, Alhadari A. Epidemiology of end-stage renal disease in Dubai: Single-center data. *Saudi J Kidney Dis Transpl.* 2017; 28(5):1119-25.
27. Goh ZS, Griva K. Anxiety and depression in patients with end-stage renal disease: impact and management challenges - a narrative review. *Int J Nephrol Renovasc Dis.* 2018;11:93-102.
28. Kutner NG. Comment on: Quality of Life, Perceptions, and Health Satisfaction of Older Adults with End-Stage Renal Disease. *J Am Geriatr Soc.* 2017;65(10):2330-2331.
29. Gerogianni S, Babatsikou F, Gerogianni G, Koutis C, Panagiotou M, Psimenou E. Social life of patients undergoing haemodialysis. *Int J Caring Sci.* 2016; 9:122-134
30. Rostami Z, Einollahi B, Lessan-Pezeshki M, Soleimani Najaf Abadi A, Mohammadi Kebar S, Shahbazian H, et al. Health-related quality of life in hemodialysis patients: an Iranian multi-center study. *Nephrourol Mon.* 2013;5(4):901-12.
31. Vanholder R, Annemans L, Brown E et al. Reducing the costs of chronic kidney disease while delivering quality health care: a call to action. *Nat Rev Nephrol* 2017; 13: 393-409
32. Tel H, Tel H. Quality of life and social support in hemodialysis patients. *Pak J Med Sci.* 2011;27(1):64-7.
33. Cruz MC, Andrade C, Urrutia M, Draibe S, Nogueira-Martins LA, Sesso Rde C. Quality of life in patients with chronic kidney disease. *Clinics.* 2011;66(6):991-5.
34. Bayoumi M, Al Harbi A, Al Suwaida A, Al Ghonaim M, Al Wakeel J, Mishkiry A. Predictors of quality of life in hemodialysis patients. *Saudi J Kidney Dis Transpl.* 2013;24(2):254-9.
35. Peng YS, Huang JW, Hung KY, Lin BS, Lin CY, Yang CS, et al. Women on hemodialysis have lower self-reported health-related quality of life scores but

- better survival than men. *J Nephrol.* 2013;26(2):366–74.
36. Zhou, X., Xue, F., Wang, H., Qiao, Y., Liu, G., & Huang, L., Li D., Wang S., Wang Q., Li L. & Li R. The quality of life and associated factors in patients on maintenance hemodialysis – a multicenter study in Shanxi province. *Renal Failure.* 2017; 39(1): 707-711.
37. Megari K. Quality of Life in Chronic Disease Patients. *Health Psychol Res.* 2013;1(3):e27.
38. Pengpid S, Peltzer K. The Impact of Chronic Diseases on the Quality of Life of Primary Care Patients in Cambodia, Myanmar and Vietnam. *Iran J Public Health.* 2018;47(9):1308–1316.