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Dental patients' knowledge, awareness, and attitude regarding infection control procedures

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RESEARCH

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ABSTRACT

Background
Assessing patients' opinion about policies against cross infection in the dental office is of significance. Since it has been shown to enhance compliance and motivation among patients and healthcare workers.

Aims
This study was designed to investigate patients' awareness, attitude and knowledge of infection control practice and the effect of demographic data on these measures.

Methods
A cross-sectional survey of 302 patients attending outpatient dental clinics to determine knowledge, attitudes, and awareness regarding infection control procedures. Questionnaire was designed and distributed in local Language.

Results
Our study revealed reasonable knowledge and awareness of PPE use and its rationale. Visual assurance was central aspect of patient perception of infection control. Knowledge was affected by several sociodemographic characteristics.

Conclusion
Even though the sample reflected a reasonable level of awareness and knowledge about infection control in dental clinics, and the possible paths of disease transmission, more knowledge is to be disseminated especially concerning Transmissible diseases.

Key Words
Attitude, infection control, knowledge

What this study adds:

1. What is known about this subject?
Few studies have evaluated the patients' awareness levels and opinions on the subject. They measured the knowledge about PPE & infection transmission.

2. What new information is offered in this study?
Impact of PPE should be disseminated especially when there is a disease outbreak and for hospital-acquired infections prevention. More awareness about modes of transmission.

3. What are the implications for research, policy, or practice?
We assessed the knowledge and behaviour among patients, which could assist in community education and policy making. It may show gaps to limit spread.

Background

Use of barriers such as gloves, masks, protective eyewear, gowns as well as sterilization and disinfection, are standard practices for dental procedures to protect both, healthcare providers and patients. However, compliance to infection control guidelines has not yet reached the desired level.[1-4] A study by Yassi et al. in 2007 reported that though the self-reported compliance to hand hygiene and use of gloves was 90 per cent and 91 per cent, respectively, the compliance rate was only 70 per cent.[5] Compliance to infection control

guidelines has been reported to reduce infection in healthcare facilities and prevent life-threatening infections such as AIDS and hepatitis.[3,4,6-8] Inadequate measures for infection control might lead to the spread of preventable diseases among both healthcare workers and patients.[9,10] Increase in nosocomial infections results in antibiotic overuse, further generating more antimicrobial-resistant pathogens.[11] Furthermore, infectious diseases are found to be more common among patients who lack the knowledge about prevention measures the disease.[9] Patients might themselves be reservoirs of infectious agents and cause their spread, posing a risk for others, especially immune-compromised patients.[12] The importance of patients' knowledge and awareness was acknowledged by Centers for Disease Control and Prevention (CDC), which developed several online educational materials to educate the community.[12,13] It has been demonstrated that adequate patient education can substantially reduce cross infection.[14,15] Several studies have focused on the healthcare workers' opinion and awareness about preventive measures.[1-4] However, few studies have evaluated the patients' awareness levels and opinions on the subject. Assessing patients' opinion about practices against cross infection in the dental office is of particular significance. Studies have shown that patients have a higher preference for hospitals where infection control is more diligent.[16-17] Hand hygiene is perceived to be critical by most patients and relatives, and plays a significant role in their selection of a healthcare center.[18]

However, the patient's concern appeared to largely revolve around hand cleanliness practices as opposed to the risks of the lack of hygiene.[18] These findings indicate the need for strict infection control measures as well as focused patient education programs containing accurate information to improve compliance and motivation among patients. Dental clinic is exposed to a wide-range of microorganisms from blood and saliva. Assessing patients' opinions regarding infection control policies in dental clinics is of particular significance. For example, Saudi Arabia has witnessed a high prevalence of infectious respiratory diseases such as the Middle East respiratory syndrome. Nonetheless, there remains a lack of information in terms of awareness and knowledge regarding infection control protocols in societies, which is necessary to gauge the status of infection control and thus develop relevant clinical and educational resources to limit the spread of infections. Therefore, this study was designed to the investigate awareness and knowledge regarding infection control practice among patients visiting dental clinics and the effect of demographic data on these measures.

Method

Patients and Methods:

Participants

This cross-sectional study was designed and approved by the ethics review committee of the Centre of Research, College of Dentistry, King Saud University, Riyadh, Saudi Arabia (**IR0221**). A total of 330 questionnaires were distributed randomly to patients attending dental clinics at King Saud University, Riyadh, Saudi Arabia. The purpose of the study was explained and uncertainties resolved prior to participation. All included subjects were adults above 18 with diverse dental problems and experiences.

Questionnaire

After reviewing the literature structured, self-administered questionnaire was developed by authors in Arabic and pretested. The pilot study was carried out on 30 male and female patients with different demographics. Participants were asked to identify any question that was difficult or does not make sense. Cronbach's alpha reliability coefficient was also calculated. No adjustments were necessary, and thus, the questionnaire was distributed to the study population.

The questionnaire consisted of two parts. The first part obtained socio-demographic data such as age, Gender, occupation, and level of education. The second part obtained information regarding awareness, knowledge, and attitude towards infection control. A 5-point Likert scale was employed to yield responses ranging from strongly agree to strongly disagree.

Statistical analysis

The collected data were analysed using SPSS Ver. 22 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp), and a two-tailed p value of ≤0.05 was considered significant. We used the frequencies, t-test, one-way analysis of variance (ANOVA), and post-hoc test to analyse the presence of statistical differences. Ordinal logistic regression analysis was adopted to identify factors associated with knowledge, awareness, and attitude. For each variable, the log likelihood, chi-square test, log odds ratio (OR) with the 95 per cent confidence interval (CI), and standard error were calculated.

Three models were developed to understand the statistical significance of the responses obtained from the participants. Model 1 tested the knowledge (risk groups, risk factors) regarding hospital-associated infections. Model 2 tested the behaviour of participants by analysing their willingness to remind their dentist to wear gloves or a mask,

awareness of the cleanliness and sterilization procedures followed in the dental clinic, and refusal to receive treatment in a dental clinic where patients with AIDS or hepatitis B virus (HBV) infection are being treated. Model 3 tested for attitudes towards acquiring hospital-based infections.

The following independent variables were included in all models: age (18–25, 26–30, 31–35, 36–40, 41–50, ≥51 years), level of education (illiterate, high school, collage/postgraduate), occupation (unemployed, student, health sector employee, non- health sector employee). The OR and 95 per cent CIs were calculated to quantify the magnitude of the association between predictors and outcomes.

Results

Cronbach's alpha reliability coefficient was 0.79. Of 330 participants, responses were obtained from 126 (41.7 per cent) males and 176 (58.3 per cent) females, amounting to a response rate of 91.5 per cent. The majority (n=109; 36.1 per cent) of the respondents were within the age range of 18-25 years. One-hundred seventy-four (57.6 per cent) respondents were educated until college or higher. Unemployed patients constituted 31.1 per cent (n=94) of the study population, with most of them being female (n=79; 26.2 per cent). Health sector employees comprised only 8.6 per cent of the total sample (Figure 1).

Most of the respondents reported that their dentist used personal protective equipment (PPE) during examination and treatment. The statement that received the highest number of disagreeing responses was "It is possible to use the same dental instrument for multiple patients if sterilized" and "I think that gloves and masks are worn only for the protection of the dentist," accounting for one-third of the sample (29.1 per cent and 30.5 per cent, respectively) (Table 1).

The t-test results showed a statistically significant difference between males and females (p<0.001) in terms of the response for the statement, "PPE is used for the protection of patients". Females were more aware of infection control protocols implemented in dental clinics, except regarding the frequency of barrier change between patients was significant among males (p=0.041) (Table 2).

ANOVA yielded a significant variation among respondents according to the level education in terms of the use of PPE during both examination and treatment (F (2, 299)=8.944, p=0.000 and F (2, 299)=8.944, p=0.001, respectively). The Tukey post hoc test showed a significant difference in responses regarding PPE use during examination between those educated until high school and college graduates (p<0.05). Similarly, a significant difference was also observed between students and non-health sector employees (p<0.05). Lastly, a significant difference was observed between health sector employees, students, and unemployed persons with regards to the responses for PPE use during treatment (p<0.05) (Table 3a & b).

Having the right to reject treatment if the dentist is not wearing PPE and replacement of surface barriers were significant factors (p≤0.006) as well as plastic barriers serving as a visual assurance (p=0.013). The Tukey post hoc analysis of these variables demonstrated differences between high school and college graduates (p<0.05). The Tukey post hoc analysis a showed difference between health sector employees and unemployed individuals in terms of the responses for the following variables (p<0.05): "I think that wearing gloves and a mask protects the patient from contracting an infection", "I remind my dentist to wear gloves or a mask", "I might contract HBV infection during dental treatment" and "I feel safer seeing instruments being taken out of sterilized bags".

Having the right to refuse treatment from a dentist who does not use PPE and the possibility of contracting infections from their dentist were significant factors among respondents. The Tukey post hoc analysis indicated differences between unemployed and employed individuals and students (p<0.05) regarding the following: "I have the right to refuse treatment from a dentist who is not wearing gloves or a mask", "I may get infected from my dentist" and "I might get infected from instruments or surfaces of the dental clinic".

Ordinal logistic regression models revealed the effect of independent variables on knowledge, behaviour and attitude of the participants (Table 1). Gender and education was a significant predictor of knowledge whereas occupation was significant predictor of behaviour. Other variables were insignificant and none of the variables were significant predictors of attitude. The three ordinal logistic regression models revealed that sex and education were significant predictors of knowledge whereas occupation was a significant predictor of behaviour. Higher age (≥51 years), post-graduates, and students showed the highest association with knowledge, behaviour and attitude (Table 4 & 5).

Discussion

We found that our participants desired PPE use to prevent infection, in conjunction with the findings of previous studies.[16,19-25] Moreover, individuals treated in dental hospitals were found to display a positive attitude towards PPE[16]. In our study, participants reported refusal of treatment in case the dental practitioner did not wear gloves or a mask or would request the dental practitioner to wear them. Furthermore, most participants were aware of the protective role of gloves for the dentist and the patient, which is similar to that reported previously.[21-23,25] Furthermore, in agreement with previous studies,[19,26,27] nearly the entire study population believed that gloves should be replaced between patients. This may reflect a significant awareness of individuals regarding the role of gloves as an intact barrier to reduce the spread of microorganisms and contamination. However, in contrast to previous studies,[28,29] most of the respondents felt comfortable when their care provider used PPE.

An onus of prevention is worth a pound of cure, and using infection control measures is undoubtedly the best approach for prevention. Patients are considered to be a good source of experiential information and can provide convenient and vital data because they witness and interact with services.[30,31] Policymakers progressively trust that urging patients to assume a more dynamic part in their safety could enhance quality, proficiency, and wellbeing and improve decision making.[26,27] The use of PPE is a proven method to prevent the spread of disease.[22] Evidence suggests that patients can significantly modify the behaviour of health care workers.[28] Moreover, visual educational material has shown to improve patient awareness.[32] Thus, the impact and significance of PPE use could be conveyed through short videos over the media, which is the main source of information among patients.[33] This is of significance when considering that most hospital-acquired infections are costly, but potentially preventable.[34]

In concordance with the above assumptions, our results confirmed that physical barriers served as visual reassurance to dental clients. Moreover, our findings indicated that patients preferred to determine the hygiene status of the clinic by themselves. They felt safer seeing these barriers when attending a dental clinic, and were more at ease when their dentist washed their hands prior to treatment. Hand washing was found to be an influential factor when selecting a health care provider among patients and their family.[35] This may suggest that infection control protocols could help in relieving the stress associated with dental visit and the fear of hospital-acquired infections.

In contrast to the findings by Ibrahim et al.[36] but in agreement with several other studies,[26,19,22,37] the present data demonstrated the existence of a reasonable level of awareness among participants about the possibility of contracting diseases in the dental office. However, our results also showed that the majority of the participants denied receiving treatment in a clinic where HIV- or HBV-infected patients are treated, which is different from that previously reported.[22] This is could be explained by the fact that patients are unaware of the transmission routes of infectious disease,[37] and may hence be anxious about contracting diseases.

In accordance with previous studies,[15,21,23] we found that sociodemographics influence knowledge and awareness of infection control. Females and educated individuals were significantly more aware of infection control practices in the dental office. Employees working in the health sector were found to be more knowledgeable and practiced safer behaviors. It would, therefore, be useful to direct health education initiatives towards males, those with a lower education status, and non-health sector employees.

The findings of this study, accordingly, have a great impact on policy makers and health educators. Moreover, this investigation was conducted in the oldest and largest governmental university where services are provided free of charge, which indicates that the study sample involved a broad stratum of the community. Data compiled from this study support the need for initiation of an educational program regarding proper infection control policies, including routes of infection, aimed at both patients and dentists. Such a program could result in lower cross infection rates and safe treatment environments in dental clinics. It may also aid in limiting communicable disease transmission within the community.

Conclusion

In conclusion, the study population demonstrated a reasonable knowledge, understanding, and awareness of PPE use and its rationale. Visual assurance is a central aspect of patient perception of infection control. Moreover, we noted several sociodemographic characteristics that influenced knowledge and behaviour among patients, which could assist in community education and for policy makers. Lastly, our data emphasize the importance of patient education and their involvement in their own safety.

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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ETHICS COMMITTEE APPROVAL

Approved by the ethics review committee of the Center of Research, College of Dentistry, King Saud University, Riyadh, Saudi Arabia (IR0221).

Figure 1: Demographic data of the sample

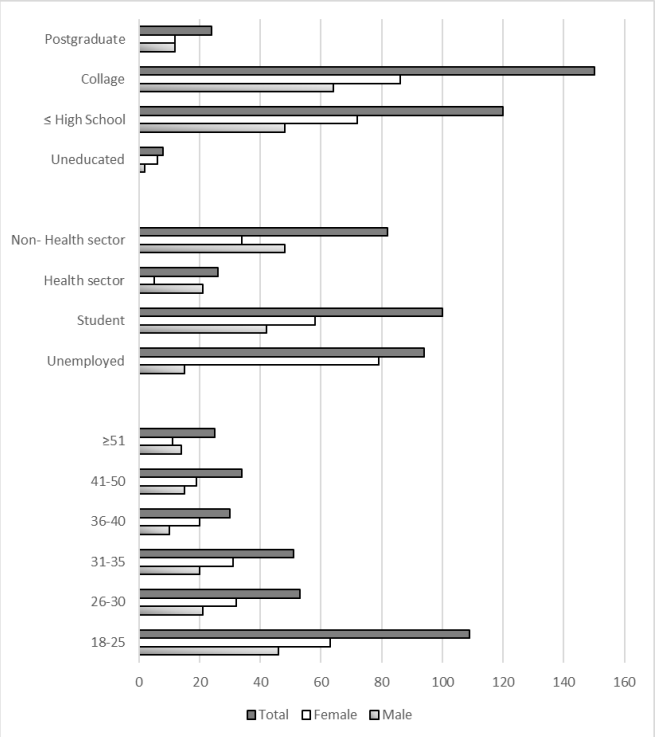

Table 1: Categorization of the questions, scoring and responses of the participants

Variable	Classification	Scoring	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
			n (%)	n (%)	n (%)	n (%)	n (%)
My dentist must wear gloves and a mask when examining me	Knowledge	4 to 0	248 (82.1)	51 (16.9)	3 (1.0)	-	-
My dentist must wear gloves and a mask during treatments (such as restorative/hygiene/extraction procedures)		4 to 0	265 (87.7)	35 (11.6)	2 (.7)	-	-
I think that gloves and a mask are worn only for the protection of the dentist		0 to 4	106 (35.1)	64 (21.2)	40 -13.2	63 (20.9)	29 -9.6
I think that wearing gloves and a mask protects the patient from contracting an infection		4 to 0	142 (47)	75 (24.8)	28 -9.3	41 -13.6	16 (5.3)
The dentist must wear new gloves for each patient		4 to 0	262 (86.6)	28 (9.3)	6 (2)	2 -0.7	4 -1.3
I have the right to refuse treatment from a dentist who is not wearing gloves or a mask		4 to 0	221 (73.2)	63 (20.9)	8 (2.6)	7 (2.3)	3 -1
I remind my dentist to wear gloves or a mask	Behaviour	4 to 0	177 (58.6)	96 (31.8)	21 -7	5 -1.7	3 -1
I feel safer when I see plastic barriers covering the equipment in a dental clinic	Attitude	4 to 0	250 (82.8)	48 -15.9	2 -0.7	1 -0.3	1 -0.3

Plastic barriers on dental equipment have to be replaced after each patient	Knowledge	4 to 0	238 (78.8	50 (16.6)	13	-	1
					-4.3		-0.3
I check for the cleanliness and sterilization of the dental clinic	Behaviour	4 to 0	120	90	55	31	6
			-39.7	-29.8	18.2)	-10.3	-2
I feel more at ease seeing my dentist wash his/her hands	Attitude	4 to 0	232	46	19	5	-
			-76.8	-15.2	-6.3	-1.7	
It is possible to use the dental instrument for multiple patients if sterilized	Knowledge	4 to 0	106	75	33	35	53
			-35.1	-24.8	-10.9	-11.6	-17.5
I feel safer seeing instruments being taken out of sterilized bags	Attitude	4 to 0	246	50	4	2	
			-81.5	-16.6	-1.3	-0.7	
Infections can only be transferred through direct contact with infected individuals	Knowledge	0 to 4	100	62 (20.5)	49 (16.2)	58	33
			-33.1			-19.2	-10.9
I might get infected from my dentist		4 to 0	107	120*	45 (14.9)	24	6
			-35.4	-39.7		-7.9	-2
I might get infected from instruments or surfaces of the dental clinic		4 to 0	155	104	26	13	4
			-51.3	-34.4	-8.6	-4.3	-1.3
I might contract AIDS during dental treatment		4 to 0	124	76	62	25	15
			-41.1	-25.2	-20.5	-8.3	-5
I might contract hepatitis B virus infection during dental treatment		4 to 0	125	87	54	26	10
			-41.4	-28.8	-17.9	-8.6	-3.3
I might contract a respiratory disease (Middle East respiratory syndrome, flu, tuberculosis, etc.) during dental treatments		4 to 0	148	101	33	15	5
			-49	-33.4	-10.9	-5	-1.7
I refuse to be treated in a dental clinic where patients with AIDS or hepatitis B are being treated	Behaviour	4 to 0	175	66	30	16	15
			-57.9	-21.9	-9.9	-5.3	-5

Table 2: Summary of t-test between gender and sample responses

Variable		N	Mean	Std. Deviation	T	Sig. (2-tailed)
I think that wearing gloves and mask protect the patient from contracting an infection	Male	126	1.72	1.10	-4.17	0
	Female	171	2.31	1.31		
Plastic barriers on dental equipment have to be replaced after each patient	Male	126	1.35	0.59	2.05	0.041
	Female	171	1.21	0.54		
It's possible to use dental interments for multiple patients if sterilized	Male	126	2.24	1.42	-2.86	0.004
	Female	171	2.73	1.52		
I might get infected from my dentist	Male	126	1.83	0.94	-2.85	0.005
	Female	171	2.16	1.02		

I might contract HBV during dental treatment	Male	126	1.86	0.99	-2.546	0.009
	Female	171	2.19	1.17		

Table 3a: One-way ANOVA Results for educational level in attitude and knowledge towards infection control

Variable		Sum of Squares	df	Mean Square	F	Sig.
My dentist has to wear gloves and mask when examining me	Between Groups	2.94	2	1.47	8.94	0
	Within Groups	49.29	299	0.16		
	Total	52.24	301			
My dentist has to wear gloves and mask during treatments. Restorative/ hygiene / extractions and so on	Between Groups	1.86	2	0.93	7.72	0.001
	Within Groups	36.09	299	0.12		
	Total	37.96	301			
I have the right to refuse treatment from a dentist who is not wearing gloves or mask	Between Groups	7.12	2	3.56	6.76	0.001
	Within Groups	157.34	299	0.52		
	Total	164.46	301			
I feel safer when I see plastic barriers covering the equipment in a dental clinic	Between Groups	1.99	2	0.99	4.41	0.013
	Within Groups	67.48	299	0.22		
	Total	69.47	301			
Plastic barriers on dental equipment have to be replaced after each patient	Between Groups	3.22	2	1.61	5.15	0.006
	Within Groups	93.58	299	0.31		
	Total	96.80	301			

Table 3b: One-way ANOVA Results for Occupation differences in attitude and knowledge towards infection control

Variable		Sum of Squares	df	Mean Square	F	Sig.
My dentist has to wear gloves and mask when examining me	Between Groups	1.72	3	0.57	3.38	0.019
	Within Groups	50.52	298	0.17		
	Total	52.24	301			
My dentist has to wear gloves and mask during treatments Restorative/ hygiene / extractions and so on	Between Groups	1.27	3	0.42	3.44	0.017
	Within Groups	36.69	298	0.12		
	Total	37.96	301			
I think that wearing gloves and mask protect the patient from contracting an infection	Between Groups	15.91	3	5.30	3.42	0.018
	Within Groups	461.23	298	1.54		
	Total	477.15	301			
I have the right to refuse treatment from a dentist who is not wearing gloves or mask	Between Groups	6.09	3	2.03	3.82	0.01
	Within Groups	158.37	298	0.53		
	Total	164.46	301			
I remind my dentist to wear gloves or mask	Between Groups	5.94	3	1.98	3.34	0.02
	Within Groups	176.90	298	0.59		
	Total	182.85	301			
I feel safer seeing interments being opened from sterilization bags	Between Groups	16.18	3	5.39	2.80	0.04
	Within Groups	572.75	298	1.92		
	Total	588.94	301			
I may get infected from my dentist	Between Groups	11.96	3	3.98	4.09	0.007
	Within Groups	289.98	298	0.97		

	Total	301.94	301			
I might get infected from instruments or surfaces of the dental clinic	Between Groups	7.47	3	2.49	3.17	0.025
	Within Groups	234.10	298	0.78		
	Total	241.57	301			
I might contract HBV during dental treatment	Between Groups	10.09	3	3.36	2.76	0.042
	Within Groups	362.50	298	1.21		
	Total	372.59	301			

Table 4: Ordinal logistic regression model results

Variable	Log likelihood	χ^2	df	p-value
Model 1. Knowledge (risk groups, risk factors) about hospital-associated infections				
Gender	-169.78	109.27	15	0
Age	-583.76	20.02	15	0.17
Education	-0.465.79	25.23	15	0.04
Occupation	-492.55	23.94	15	0.06
Model 2. Behavior of the participants (willingness to remind their dentist to wear gloves or mask, check for the cleanliness and sterilization of the dental clinic, and refusal to be treated in a dental clinic where AIDS or HBV patients are being treated)				
Gender	-63.87	4.04	3	0.25
Age	-363.68	0.31	3	0.95
Education	-282.10	2.90	3	0.40
Occupation	-260.64	9.33	3	0.02
Model 3. Attitudes towards acquiring hospital based infections				
Gender	-109.37	5.63	3	0.13
Age	-167.58	0.28	3	0.96
Education	-138.33	6.86	3	0.07
Occupation	-115.99	3.02	3	0.38

Table 5: Odds ratio revealing the magnitude of association of study variables

Variable			Log Odds Ratio	SE
Knowledge	Gender	Category	-35.9(-14572.65 - 14500.79)	0.70
	Age	26-30	57.17(-11784.20 - 11898.54)	0.65
		31-35	58.05(-11783.31 - 11899.42)	0.64
		36-40	58.67(-11782.70 - 11900.04)	0.64
		41-50	59.3(-11782.06 - 11900.67)	0.64
		≥51	60.33(-11781.03 - 11901.70)	0.7
	Education	Elementary	-2.18(-3.419 - -0.94)	0.63
		High School	-0.56(-1.751 - 0.623)	0.61
		Collage	2.477(1.2054 - 3.749)	0.65
		Post Graduate	5.569(3.2693 - 7.869)	1.17
	Occupation	Student	-2.13 -3.347 - -0.92)	0.62
		Health sector	-0.57(-1.753 - 0.602)	0.6
		Non- Health sector	-0.08(-1.259 - 1.095)	0.6
Attitude	Gender		-0.87(-1.639 - -0.1)	0.39
	Age	26-30	-0.33(-1.035 - 0.37)	0.36
		31-35	0.426(-0.276 - 1.13)	0.36

		36-40	0.956(0.2446 - 1.668)	0.36
		41-50	1.466(0.7398 - 2.193)	0.37
		≥51	2.481(1.6883 - 3.274)	0.4
	Education	Elementary	-2.66(-3.431 - -1.89)	0.39
		High School	-1.21(-1.924 - -0.51)	0.36
		Collage	1.603(0.8432 - 2.363)	0.39
		Post Graduate	4.826(2.7644 - 6.887)	1.05
	Occupation	Student	-1.22(-1.929 - -0.51)	0.36
		Health sector	0.127(-0.564 - 0.82)	0.35
		Non- Health sector	0.558(-0.138 - 1.255)	0.35
Behaviour	Gender		0.225(-0.452 - 0.903)	0.22
	Age	26-30	-0.33(-0.949 - 0.278)	0.31
		31-35	0.397(-0.217 - 1.011)	0.31
		36-40	0.976(0.351 - 1.6)	0.32
		41-50	1.561(0.916 - 2.207)	0.33
		≥51	2.557(1.835 - 3.279)	0.37
	Education	Elementary	-2.13(-2.806 - -1.45)	0.34
		High School	-0.67(-1.291 - -0.05)	0.32
		Collage	2.077(1.380 - 2.773)	0.36
		Post Graduate	5.344(3.304 - 7.385)	1.04
	Occupation	Student	-1.41(-2.047 - -0.78)	0.32
		Health sector	-0.05(-0.661 - 0.556)	0.31
		Non- Health sector	0.374(-0.238 - 0.987)	0.31