

# Quality of Life among Medical Students at the Clinical Levels at Sana'a University

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## Research Article

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# Abstract

## Background

The World Health Organization (WHO) defines quality of life (QoL) as individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. Starting clinical training means a new challenge that requires special capabilities in an unfavorable environment. We aimed to assess the (QoL) among medical students at the clinical levels at Sana'a University and correlate it with sociodemographic factors.

## Methodology

: A descriptive cross-sectional study with a sample size of 371 medical students at the clinical levels and internship from January 1st to February 15th, 2023. We ran a stratified random sample and used the Arabic WHOQoL-BRE and a sociodemographic questionnaire. Data were analyzed using the statistical package for social sciences.

## Results

The participants scored highest in the overall (QoL) ( $69.27 \pm 20.77$ ) and general health ( $67.70 \pm 25.67$ ). They scored lower in other domains in a descending manner: physical health ( $64.38 \pm 15.73$ ), social relationships ( $61.61 \pm 22.70$ ), psychological health ( $57.16 \pm 15.31$ ) and environment ( $48.63 \pm 15.43$ ). Leisure time (LT) was found to be the most important predictor of the QoL in all aspects, followed by family income in the overall (QoL), physical health and environment. Advancing age, male gender, being rural and living alone or in dorms scored poorly in the environment. Females scored better in the overall (QoL) than males. The social relationships were in favor of married students. Initial clinical levels scored poorly in terms of physical health.

## Conclusion

Our participants have a relatively good overall (QoL) and general health. Nevertheless, they scored poorly in the psychological health and environment. Sufficient family income and (LT) are crucial to a better (QoL). We believe orientation programs, revised curricula, proper and adequate clinical training, level-compatible and objective exams and creating sources of income for interns would significantly improve their (QoL). Medical students at the clinical levels are in extreme need for (LT). Dorms should reconsider their services, and rural inhabitants need support from all.

## Background

The transition to clinical training in the presence of unrevised and unupdated curricula represents a period of major impairment to the quality of life (QoL) of medical students<sup>[1][2]</sup>. The World Health Organization (WHO) defines (QoL) as “individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns”<sup>[3]</sup>. Because of its longer duration and heavier academic workload, the medical program is known to be more stressful than other programs<sup>[4]</sup>. Inadequate time for clinical training, feeling that their training is not optimal and fear of causing harm to patients are the leading factors of stress among medical students<sup>[5]</sup>. Therefore, they lose their enthusiasm and desire for further knowledge over the years<sup>[6]</sup>. Transition to a higher educational level, curricular pitfalls, extensive workload, student-instructor relationship, contact with illness and death, family absence, changes in sleep and food routines together with an insecure professional future<sup>[7][8][9]</sup> as well as financial issues and loans can all affect the (QoL) of medical students<sup>[10][11]</sup>. Accordingly, these increasing demands interfere with time for physical and leisure activities (LAs), enjoying the family environment and social relationships and taking care of their own health<sup>[12]</sup>. A significant relationship exists between the opportunity for physical activity (PA) and (LAs) on the one hand and the (QoL) on the other hand among medical students<sup>[13]</sup>. Several sociodemographic variables were found to be significantly correlated with the (QoL) of medical students, e.g., gender, marital status, family type, monthly income and academic year<sup>[14]</sup>.

In Yemen, to the best of our knowledge, there is only one similar study at Hadramout University that, using the WHOQOL-Bref, attributed the poor (QoL) among medical students to certain sociodemographic factors and a shortage in basic life needs exacerbated by the ongoing war<sup>[15]</sup>. Starting clinical training means a new challenge that requires special capabilities in an unfavorable environment. This environment to some extent lacks revised curricula, adherence to level-compatible learning objectives and exams, inadequate clinical training, facilitated transportation, student esteem, patient cooperation, increasing financial demands and low family income in the presence of economic recession, war and siege. Consequently, we aimed to assess the effects of these conditions on the (QoL) of medical students at the clinical levels at Sana'a University and correlate them with different sociodemographic factors.

## Methodology

### Study design and setting

A descriptive cross-sectional study that targeted medical students at the clinical levels at the faculty of medicine and health sciences, Sana'a University for the academic year 2022/2023. The duration of the medical program, medicine bachelor and bachelor of surgery (MBBS), at Sana'a University is six years, followed by a 12-month internship. The six years are classified into three phases as follows: basic medical sciences (1st and 2nd years), applied medical sciences (3rd year) and clinical sciences phase (4th, 5th and 6th years).

The total population was 2729 students from 6 batches instead of 4 due to overlap as a result of the cumulative consequences of the civil war and COVID-19 pandemic. Two batches were at level 4; one was at the beginning (level 4 beginners), and the other was short of the final exams. Another two batches were at level 6; one had completed the final bachelor's exams approximately 2 months earlier (level 6 graduates), while the other was about a month after beginning the level (level 6 beginners). We used Epi Info 7 software (CDC, USA) to calculate the sample size, which yielded 337 students and added 10% to become 371 students to increase the response rate. The participants were selected by a stratified random sample according to the educational level and gender within each level from records obtained from the information technology department of the faculty.

## Aims

The main objective of our study was to assess the (QoL) of medical students at the clinical levels at Sana'a University. We also assessed the prevalence of (PA) and opportunity for (LAs). Moreover, we tested the reliability of the WHOQoL-BREF as is the case in the literature.

## Study instrument

- The World Health Organization Quality of Life Assessment abbreviated Arabic version (WHOQoL-BREF Arabic).
- A sociodemographic questionnaire was designed by the research team based on reviewing the literature.

The WHOQoL-BREF is composed of six categories, including overall (QoL) and general health, each represented by a single question. In addition, it consists of several items within four domains: physical health (7 items), psychological health (6 items), social relationships (3 items), and environment (8 items). The WHOQoL-BREF has its own scoring systems, and the scores are represented on a 0-100 scale <sup>[3]</sup>.

## Data collection and analysis

The nominated participants were provided with a link to complete the questionnaire via docs.google.com. The participants were notified to fill out the questionnaire carefully, contact and receive consultation from the research team if they faced any problems. Data collection started from the 1st of January until the 15th of February, and a participant could participate only once. The collected data were revised, coded, introduced to a personal computer and finally analyzed using the statistical package for social sciences (SPSS Version 21). We used Cronbach's alpha coefficient to test the WHOQoL-BREF reliability.

## Results

### Sociodemographic data

A total of 336 out of 371 medical students completed the questionnaire, giving a response rate of 90.5%. Of the respondents, 186 (55%) were male, and 150 (44%) were female. They fell into four age groups with

five-year intervals; 83.3% were 23–27 years old, and 18.8% were married. Table (1) shows the distribution of the participants according to educational level. The respondents were almost homogenous regarding tuition fees payment 52.1% free and 47.9% paid. For family income, 54%, 36% and 10% have somehow sufficient, sufficient and insufficient income respectively. Employed students represented 19.3% of the participants; of them, 99.7% were part-time. Rural students represented 25% of the participants, and Figure (1) shows the distribution of participants according to their residency. The prevalence of performing physical activities 3 times a week for 30 minutes each among medical students at the clinical levels at Sana'a University was 26.2%. On the other hand, while 40% have a moderate to good opportunity for (LAs), 60% do not.

Table (1): Distribution of participants according to educational level.

<b>Educational level</b>				
	Frequency	Percent	Valid Percent	Cumulative Percent
Internship	38	11.3	11.3	11.3
Level 6- batch 33	60	17.9	17.9	29.2
Level 6 – batch 34	52	15.5	15.5	44.6
Level 5	52	15.5	15.5	60.1
Level 4 – batch 36	51	15.2	15.2	75.3
Level 4 – batch 37	83	24.7	24.7	100.0
Total	336	100.0	100.0	

Figure (1): Distribution of participants according to their residency.

**Domains mean scores in general and in relation to the sociodemographic factors:** tables 2–14.

Table (2): Mean and std. deviation for domain scores.

	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Overall quality of life	336	69.2708	20.77573
General health	336	67.7083	25.67800
Physical health	336	64.3814	15.73264
Psychological health	336	57.1677	15.31473
Social relationships	336	61.6195	22.70566
Environment	336	48.6328	15.43890

Table (3): Relationship between quality of life and age.

		<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>P. Value</b>	
Overall quality of life	17–22yrs	42	71.4286	25.64499	.144	
		23–27yrs	280	69.5536	19.61266	
			28–32yrs	13	57.6923	25.78884
			33–37yrs	1	50.0000	.
			Total	336	69.2708	20.77573
General health	17–22yrs	42	71.4286	26.23268	.090	
			23–27yrs	280	67.8571	25.45037
			28–32yrs	13	55.7692	25.31848
			33–37yrs	1	25.0000	.
			Total	336	67.7083	25.67800
Physical health	17–22yrs	42	62.6701	17.10438	.578	
			23–27yrs	280	64.8469	15.33387
			28–32yrs	13	59.6154	20.06498
			33–37yrs	1	67.8571	.
			Total	336	64.3814	15.73264
Psychological health	17–22yrs	42	59.0278	16.99167	.261	
			23–27yrs	280	57.1577	14.80557
			28–32yrs	13	50.3205	19.65130
			33–37yrs	1	70.8333	.
			Total	336	57.1677	15.31473



		<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>P. Value</b>	
Social relationships	17–22yrs	42	62.6984	25.50228	.647	
			23–27yrs	280	61.8304	22.31969
			28–32yrs	13	53.8462	22.72403
			33–37yrs	1	58.3333	.
			Total	336	61.6195	22.70566
Environment	17–22yrs	42	54.8363	15.54403	.002	
			23–27yrs	280	48.2924	15.10607
			28–32yrs	13	36.5385	14.89900
			33–37yrs	1	40.6250	.
			Total	336	48.6328	15.43890

Table (4): Relationship between quality of life and gender.

	<b>Gender</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>P. Value</b>
Overall quality of life	Male	186	65.8602	21.68102	.001
	Female	150	73.5000	18.82229	
General health	Male	186	66.8011	27.07563	.472
	Female	150	68.8333	23.87338	
Physical health	Male	186	64.9386	16.33426	.471
	Female	150	63.6905	14.97851	
Psychological health	Male	186	58.0645	15.46703	.232
	Female	150	56.0556	15.10116	
Social relationships	Male	186	61.6039	23.83431	.989
	Female	150	61.6389	21.30231	
Environment	Male	186	45.7661	15.16133	.000
	Female	150	52.1875	15.08396	

Table (5): Relationship between quality of life and marital status.

	<b>Marital status</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>p. value</b>
Overall quality of life	Married	63	70.6349	20.34961	.564
	Unmarried	273	68.9560	20.89693	
General health	Married	63	65.8730	24.30551	.530
	Unmarried	273	68.1319	26.00885	
Physical health	Married	63	64.5125	17.65873	.942
	Unmarried	273	64.3511	15.28925	
Psychological health	Married	63	59.4577	16.05404	.188
	Unmarried	273	56.6392	15.12025	
Social relationships	Married	63	67.5926	20.03084	.020
	Unmarried	273	60.2411	23.09391	
Environment	Married	63	48.9583	15.81537	.853
	Unmarried	273	48.5577	15.37933	

Table (6): Relationship between quality of life and educational level.

		<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>P .value</b>
Overall quality of life	Internship	38	69.7368	22.62943	.184
	Level 6 - batch 33	60	70.0000	15.12658	
	Level 6 – batch 34	52	75.0000	20.41241	
	Level 5	56	69.6429	21.16724	
	Level 4 – batch 36	47	68.6170	23.00052	
	Level 4 – batch 37	83	65.0602	21.71734	
	Total	336	69.2708	20.77573	
General health	Internship	38	73.6842	18.33193	.633
	Level 6 - batch 33	60	68.7500	24.62645	
	Level 6 – batch 34	52	69.2308	23.01714	
	Level 5	56	65.6250	27.20399	
	Level 4 – batch 36	47	65.9574	27.79268	
	Level 4 – batch 37	83	65.6627	28.61403	
	Total	336	67.7083	25.67800	
Physical health	Internship	38	67.1053	12.65167	.007
	Level 6 - batch 33	60	67.1429	16.37030	
	Level 6 – batch 34	52	67.1016	14.56891	
	Level 5	56	61.6709	16.12352	
	Level 4 – batch 36	47	67.4012	14.79333	
	Level 4 – batch 37	83	59.5525	16.41482	
	Total	336	64.3814	15.73264	
Psychological health	Internship	38	59.1009	14.16651	.609
	Level 6 - batch 33	60	59.3750	13.97016	
	Level 6 – batch 34	52	57.3718	15.99154	
	Level 5	56	54.6131	13.77760	
	Level 4 – batch 36	47	56.8262	16.51712	
	Level 4 – batch 37	83	56.4759	16.65717	
	Total	336	57.1677	15.31473	

		<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>P .value</b>
Social relationships	Internship	38	60.6360	19.56014	.821
	Level 6 - batch 33	60	59.7222	22.49276	
	Level 6 – batch 34	52	64.9840	18.15757	
	Level 5	56	62.4256	19.47044	
	Level 4 – batch 36	47	62.8546	23.03297	
	Level 4 – batch 37	83	60.0904	28.26061	
	Total	336	61.6195	22.70566	
Environment	Internship	38	49.0132	12.93796	.533
	Level 6 - batch 33	60	48.7500	14.24755	
	Level 6 – batch 34	52	50.6611	15.30101	
	Level 5	56	48.9955	14.71929	
	Level 4 – batch 36	47	50.3324	15.65532	
	Level 4 – batch 37	83	45.8961	17.65696	
	Total	336	48.6328	15.43890	

Table (7): Relationship between quality of life and tuition fees payment.

	Tuition fees payment	N	Mean	Std. Deviation	P .value
Overall quality of life	Paid	161	67.1296	21.12375	.068
	Free	175	71.2644	20.30431	
General health	Paid	161	66.2037	26.35641	.301
	Free	175	69.1092	25.02449	
Physical health	Paid	161	62.7866	15.64480	.073
	Free	175	65.8662	15.71345	
Psychological health	Paid	161	56.2500	15.73653	.290
	Free	175	58.0220	14.90587	
Social relationships	Paid	161	60.8796	23.81712	.565
	Free	175	62.3084	21.66600	
Environment	Paid	161	49.2284	16.04090	.496
	Free	175	48.0783	14.88152	

Table (8): Relationship between quality of life and family income.

	<b>N</b>		<b>Mean</b>	<b>Std. Deviation</b>	<b>P .value</b>
Overall quality of life	Sufficient	121	75.2066	19.49783	.000
	Somehow sufficient	181	68.7845	18.42893	
	Insufficient	34	50.7353	25.73561	
	Total	336	69.2708	20.77573	
General health	Sufficient	121	70.2479	25.06534	.014
	Somehow sufficient	181	68.2320	24.41928	
	Insufficient	34	55.8824	31.41778	
	Total	336	67.7083	25.67800	
Physical health	Sufficient	121	66.4994	16.00021	.013
	Somehow sufficient	181	64.2463	15.01600	
	Insufficient	34	57.5630	16.95251	
	Total	336	64.3814	15.73264	
Psychological health	Sufficient	121	58.4711	16.14580	.004
	Somehow sufficient	181	57.8269	13.90737	
	Insufficient	34	49.0196	17.34900	
	Total	336	57.1677	15.31473	
Social relationships	Sufficient	121	62.0523	22.78880	.059
	Somehow sufficient	181	62.9604	22.22177	
	Insufficient	34	52.9412	23.73769	
	Total	336	61.6195	22.70566	
Environment	Sufficient	121	55.2428	15.54257	.000
	Somehow sufficient	181	46.4779	13.18866	
	Insufficient	34	36.5809	16.03680	
	Total	336	48.6328	15.43890	

Table (9): Relationship between quality of life and employment.

		N	Mean	Std. Deviation	P .value
Overall quality of life	Yes, medical	29	73.2759	21.05587	.498
	Yes, nonmedical	36	67.3611	18.72684	
	No	271	69.0959	21.02058	
	Total	336	69.2708	20.77573	
General health	Yes, medical	29	73.2759	23.07890	.475
	Yes, nonmedical	36	67.3611	23.76931	
	No	271	67.1587	26.19105	
	Total	336	67.7083	25.67800	
Physical health	Yes, medical	29	68.8424	15.59371	.257
	Yes, nonmedical	36	64.9802	13.73477	
	No	271	63.8245	15.96671	
	Total	336	64.3814	15.73264	
Psychological health	Yes, medical	29	59.7701	17.26155	.047
	Yes, nonmedical	36	62.3843	12.25903	
	No	271	56.1962	15.34016	
	Total	336	57.1677	15.31473	
Social relationships	Yes, medical	29	65.8046	20.27157	.250
	Yes, nonmedical	36	65.8565	24.83716	
	No	271	60.6089	22.62251	
	Total	336	61.6195	22.70566	
Environment	Yes, medical	29	48.7069	17.16755	.827
	Yes, nonmedical	36	47.1354	13.49551	
	No	271	48.8238	15.53168	
	Total	336	48.6328	15.43890	

Table (10): Relationship between quality of life and residency.



		<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>P. value</b>
Overall quality of life	Own family	222	70.7207	19.86205	.196
	Host family	16	71.8750	12.50000	
	Dormitory	53	64.6226	25.20777	
	Alone	45	66.6667	21.32007	
	Total	336	69.2708	20.77573	
General health	Own family	222	67.6802	24.59907	.919
	Host family	16	71.8750	25.61738	
	Dormitory	53	67.4528	27.98734	
	Alone	45	66.6667	28.70302	
	Total	336	67.7083	25.67800	
Physical health	Own family	222	64.3983	14.82650	.653
	Host family	16	66.7411	11.78887	
	Dormitory	53	65.5660	16.44252	
	Alone	45	62.0635	20.10652	
	Total	336	64.3814	15.73264	
Psychological health	Own family	222	57.0946	14.70438	.918
	Host family	16	59.1146	11.20296	
	Dormitory	53	57.7044	15.95843	
	Alone	45	56.2037	18.79461	
	Total	336	57.1677	15.31473	
Social relationships	Own family	222	61.4114	22.47989	.266
	Host family	16	72.3958	18.05823	
	Dormitory	53	59.9843	22.53232	
	Alone	45	60.7407	25.08648	
	Total	336	61.6195	22.70566	
Environment	Own family	222	50.9713	15.12865	.001
	Host family	16	48.6328	9.94573	
	Dormitory	53	43.8090	14.95549	

	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>P. value</b>
Alone	45	42.7778	16.62726	
Total	336	48.6328	15.43890	

Table (11): Relationship between quality of life and inhabit.

	<b>Inhabit</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>P. value</b>
Overall quality of life	Urban	252	70.5357	20.87266	.053
	Rural	84	65.4762	20.12939	
General health	Urban	252	67.8571	25.02133	.854
	Rural	84	67.2619	27.70765	
Physical health	Urban	252	64.7959	15.25400	.404
	Rural	84	63.1378	17.12493	
Psychological health	Urban	252	57.3413	15.58961	.719
	Rural	84	56.6468	14.53656	
Social relationships	Urban	252	62.7480	21.79251	.115
	Rural	84	58.2341	25.08333	
Environment	Urban	252	51.0913	14.84648	.000
	Rural	84	41.2574	14.90257	

Table (12): Relationship between quality of life and physical activity.

	Physical activity	N	Mean	Std. Deviation	P .value
Overall quality of life	Yes	88	71.0227	20.01665	.358
	No	248	68.6492	21.04290	
General health	Yes	88	72.1591	24.98040	.058
	No	248	66.1290	25.78594	
Physical health	Yes	88	66.7614	15.54731	.099
	No	248	63.5369	15.74248	
Psychological health	Yes	88	60.4640	14.39214	.019
	No	248	55.9980	15.48868	
Social relationships	Yes	88	63.6364	21.82713	.333
	No	248	60.9039	23.00981	
Environment	Yes	88	50.2841	16.49269	.243
	No	248	48.0469	15.03849	

Table (13): Relationship between quality of life and leisure activities.

		Pearson Correlation	P value
Overall quality of life	Leisure activities	.294**	.000
General health	Leisure activities	.239**	.000
Physical health	Leisure activities	.380**	.000
Psychological health	Leisure activities	.390**	.000
Social relationships	Leisure activities	.306**	.000
Environment	Leisure activities	.593**	.000

Table (14): Reliability of the WHOQOL-BREF.

Domain	Cronbach's Alpha
physical health	.736
psychological health	.772
Social relationships	.696
Environmental health	.786
Total	.924

## Discussion

In general, our participants scored lower than their fellows at Andhra Medical College in the overall (QoL) and general health <sup>[16]</sup> but had a better overall (QoL) than those in the clinical internship at Tabriz University of Medical Sciences <sup>[17]</sup>. Our findings are higher than those scored by medical students of Hadramout University in the psychological health, physical health and social relationships but lower in the environment <sup>[15]</sup>. Asian and European medical students at New Zealand University had higher domain mean scores than our participants, except in the social relationships, where Asian participants scored slightly lower than ours <sup>[18]</sup>. Furthermore, our participants had relatively better scores in the social relationships than those at Tabriz University of Medical Sciences in Iran <sup>[17]</sup> and China Medical University <sup>[2]</sup>. It is obvious that the (QoL) of medical students at the clinical levels at Sana'a University is neither bad nor good, and the lowest scores are in the environment and psychological health domains. This could be attributed to inappropriate and inadequate clinical training, traditional unrevised curricula, level-mismatched exams and increasing financial requirements with transition to clinical training. For the advanced levels and interns, thinking of postgraduate studies, future careers and providing for their parents and starting their own families could be possible causes. This is aggravated by the miserable condition of the country and the consecutive economic recessions along with prohibitive expensiveness and poverty together with lack of safety and nutritional security.

According to the literature reviewed, we gathered and added several sociodemographic factors that could have an important impact on the (QoL) of medical students at the clinical levels directly or indirectly. These included age, gender, marital status, educational level, tuition fees payment, employment either medical or nonmedical and part or full-time, residency, inhabit and (PA) and (LAs).

Age was found to be significant in the environment, being best for young ages and worst for advanced ages. Our findings are in accordance with those at Al-Imam Muhammad Ibn Saud Islamic University <sup>[19]</sup>. This could be due to higher levels of stress, future expectations and more responsibilities carried by individuals with the advancement of age.

The mean scores regarding gender are significant in the overall (QoL) and environment, where female students scored better in both. This is completely consistent with that found at Hadramout University <sup>[15]</sup>,

Andhra Medical College in the overall (QoL) <sup>[16]</sup>, Tehran University of Medical Sciences <sup>[20]</sup> and China Medical University in the environment <sup>[2]</sup>. This variation in scores could be due to extra responsibilities imposed on males in the context of daily life.

Being married is a favorable factor that was found to improve social relationships. There were no significant score differences or P-values in other domains. Married students at King Faisal University had better scores in all domains <sup>[14]</sup>, and those at Tabriz University of Medical Sciences had a better overall (QoL) <sup>[17]</sup>.

Regarding educational level, only in the physical health domain did the results reveal a significant relationship between educational level and (QoL), where level 4 beginners scored the lowest, followed by students at level 5. Despite being insignificant, the overall (QoL) was best for level 6 beginners, followed by level 6 graduates, and worst for level 4 beginners, followed by those short of the final exams for the same level. Other than the overall (QoL) and physical health, the lowest scores were in the environment: minimum for level 4 beginners and maximum level 6 beginners, followed by psychological health: minimum for level 5 and maximum for level 6 graduates. Intermediate scores are found in the social relationships, being lowest for level 6 graduates and highest for level 6 beginners. Except for the environment, clinical students at Sana'a University scored higher than their fellows at Hadramout University <sup>[15]</sup>. In addition, except for the environment and psychological health being much lower, they scored very closely to their peers in a multicenter study involving 22 Brazilian medical schools <sup>[21]</sup>. Our findings for the 4th and 5th levels are relatively higher in the physical health than of corresponding levels at Al-Imam Muhammad Ibn Saud Islamic University but slightly lower than those scored in the environment with no significant variation in the psychological health and social relationships <sup>[19]</sup>. We also found that our participants at the 4th and 5th levels scored lower than Asian students in the physical health and environment and lower than European students in all domains at New Zealand University <sup>[18]</sup>. The findings for level 6 exhibited better scores in the physical health but lower scores in the psychological health and environment in comparison to those found at King Abdulaziz University <sup>[22]</sup>. However, our participants scored lower in the four domains as well as the overall (QoL) and general health, contrary to their fellows at Andhra Medical College <sup>[16]</sup>. Our interns scored higher than the interns of Tabriz University of Medical Sciences in the overall (QoL) and similarly in the social relationships but lower in the physical health, psychological health and environment <sup>[17]</sup>. The results, either significant or not, revealed that level 6 beginners and graduates are superior to the others in the (QoL), and level 4 and 5 students are inferior in order. This could be explained by the fact that level 4 students do not get the appropriate orientation either academically or clinically on starting the clinical education that they keep learning from the difficulties they face and try to cope with. Furthermore, when transiting level 5, they have to cover many lectures they were supposed to have at level 4 in addition to the lectures of level 5 itself along with the clinical training. Moreover, all the theoretical lectures must be completed at level 5, so it is a year with a very heavy academic workload. The results for level 6 beginners seem favorable but are not. These findings are explained and justified as follows: the 6th academic year is left for training only and unfortunately is mostly unsupervised in most courses such that students either do not receive proper

training and orientation or underestimate the training in this period and advocate their time preparing for the final exams. The final bachelor's exam period is the most stressful time for (MBBS) students, but unfortunately, the timing of data collection occurred relatively far from this period. Interns represent the lowest percentage (10%) in the study population, while the minimum percentage among the other levels is 14%. This is possibly because they may have postponed the internship and started working in other cities to provide as much as possible for their families. Those who are still performing their internship at their training hospital in Sana'a city obtained moderate overall (QoL), and probably some of them are employed. Their choice for a city to work in depends on the monthly income they are going to get.

Despite a thorough review of the literature, we could not find previous works that considered tuition fees payment. We did not find a significant relationship in this regard ( $P$ -value  $> 0.05$ ), yet those who paid obtained lower scores in the overall (QoL), general health, psychological health and social relationships. It is observed that the majority of those who pay suffer more and harder than they take loans, deal with difficult access to do their exams and get their results obscured rather than the other needs such as snacks, books and transportation.

The second most significant relationship to the (QoL) is found in correlation with the family income in the overall (QoL), general health, physical health, psychological health and environment; maximum scores for sufficient income and minimum scores for insufficient income. Previous studies have shown that family/individual income is an important predictor of the (QoL) among medical students<sup>[14][17][23]</sup>. Unfortunately, Yemen is a low-income country and, moreover, is under siege and in civil war with repetitive financial crises, thus aggravating the miserable condition of the general population as a whole and medical students in particular owing to the higher financial demands of medical education itself.

In terms of employment, only psychological health is statistically significant, being best for nonmedical employees, followed by medical employees. The other aspects, regardless of being statistically insignificant ( $P$ -value  $> 0.05$ ), showed higher scores for the employees. Only 3 students worked full-time in comparison to 59 students working part-time, making it difficult for us to correlate such a comparison to the (QoL). Our findings are against those found at Tabriz University of Medical Sciences<sup>[17]</sup>. We think that it is a source of income that improves the (QoL) and helps for daily needs all required for our students rather than the work itself during studying. It is no doubt that employed individuals probably have lower academic performance than unemployed individuals, yet it was very difficult to obtain such academic records.

Regarding residency, a significant relationship emerged in the environment best for those living with their own families, followed by those with host families, and worst for those living in dormitories, followed by those living alone. Those living with family scored slightly better than those living alone or in dormitories in the other aspects of (QoL), although the difference was statistically insignificant. Our findings, despite being relatively lower, are consistent with those exhibited at Hadramout University<sup>[15]</sup> and Al-Imam Muhammad Ibn Saud Islamic University<sup>[19]</sup>. This could be related to unavailability and/or poor quality services in the dorms and for those living alone.

Only 84 of 336 medical students came from rural origins and scored lower than their urban colleagues in the environment. The scores in the other domains are closely related although lower for rural participants and are statically insignificant. This is in agreement with findings at China Medical University, where rural students scored lower than urban students in the psychological health and social relationships [2], but in disagreement with those at Andhra Medical College in the same domains [16]. This may be explained by the belief that rural students live away from their families in dorms or alone where they, to some extent, have unfavorable environment for living.

The prevalence of (PA) among the participants for a minimum of 3 times a week for 30 minutes each was 26.2%. (PA) appeared to be an important factor in the psychological health in favor of those engaging in (PA). (PA) also showed better scores in the other domains regardless of being statistically insignificant. On the other hand, while 40% of the participants have a moderate to good opportunity for (LAs) 60% do not. A strong positive and significant relationship exists between (LAs) and the four domains. The finding of (PA) is in general agreement with that at China Medical University, [2] and general disagreement with that at Andhra Medical College [16]. The finding of (LAs) agrees with that noticed at 22 Brazilian medical schools in the psychological health and environment [13]. While (PA) and (LAs) seem to improve the (QoL) of medical students, only a few students perform (PA) and have good opportunity for (LAs), and this could be due to the study overload, inadequate clinical training and exam stress that make them advocate all their time for studying. In addition, a lack of time management and accessible places for performing (PA) contribute greatly.

The reliability of the WHOQoL-BREF was expressed by Cronbach's alpha coefficient. We found that the WHOQoL-BREF preserves acceptable reliability in assessing the (QoL) among medical students.

A potential limitation of our study is its, cross-sectional design, which cannot detect the causal relationships between variables. Our study was limited to one medical school, eliminating the possibility of comparing results with other college students. The relatively small sample size was also one of the limitations of our study that could affect some of the characteristics with low prevalence, including being married, employed, rural and living alone or in dorms. An important limitation is that our results may not be informative regarding the last clinical level students (Level 6), as they were not exposed to the expected academic stress at the time of data collection, and the WHOQoL-BREF limits the participants' answers to the last two weeks only. However, the bachelor's exams at the end of clinical training are believed to negatively impact all aspects of the (QoL) of (MBBS) students at Sana'a University. Future research with a longitudinal design can be conducted to trace changes in medical students' (QoL) over time. Multi-institutional studies with larger sample sizes are needed.

## Conclusion

Medical students at the clinical levels at Sana'a University have relatively good overall (QoL) and general health, moderate physical health and social relationships and impaired psychological health and environment. We found that sufficient family income and opportunity for (LAs) are the most important

determinants of a better (QoL). Advancing age, male gender, rural inhabitants and living alone or in dorms had lower environmental scores. Male students also had a lower overall (QoL), and married students had better social relationships. Alongside family income, being employed, performing (PA) and availability for (LT) are the most important predictors of better psychological health.

We think that revising the curricula, setting and adhering to learning objectives, providing orientation programs and facilitating transportation together with wise distribution of the academic workload in the different academic years would significantly enhance the (QoL) of medical students. The student-doctor relationship should be strengthened, medical students should be involved in (PA) and (LAs), interns should have sources for income, the curricula need to be supplemented with courses that build up students' personal skills, such as time and stress management, and dorms should improve their services.

## **Abbreviations**

(QoL): quality of life, (WHO): World Health Organization, (PA): physical activity, (LAs); leisure activities, (LT); leisure time.

## **Declarations**

### **Ethical approval**

Clearance was granted from the deanery and department of community medicine of Ethics Committee at the Faculty of Medicine and Health Sciences, Sana'a University. Before completing the data, informed electronic consent was obtained from the participants before answering the questionnaire. The participants were briefed about the objectives of the study, and it was explained that their responses would be handled with a high level of confidentiality and anonymity.

### **Consent for publication**

Not applicable.

### **Availability of data and materials**

The datasets generated and/or analyzed during the current study are not publicly available due to privacy and preservation of the authors' rights but are available from the corresponding authors on reasonable request.

### **Competing interests**

The authors declare that they have no competing interests.

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## Authors' contribution

<sup>1</sup>A.M.A analyzed and interpreted the results and discussion and wrote the declarations. <sup>2</sup>M.N.A reviewed the literature and prepared the abstract and references. <sup>3</sup>A.A.A prepared the methodology. <sup>4</sup>A.A.A wrote the conclusion. All the authors have read and approved the manuscript.

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## Figures

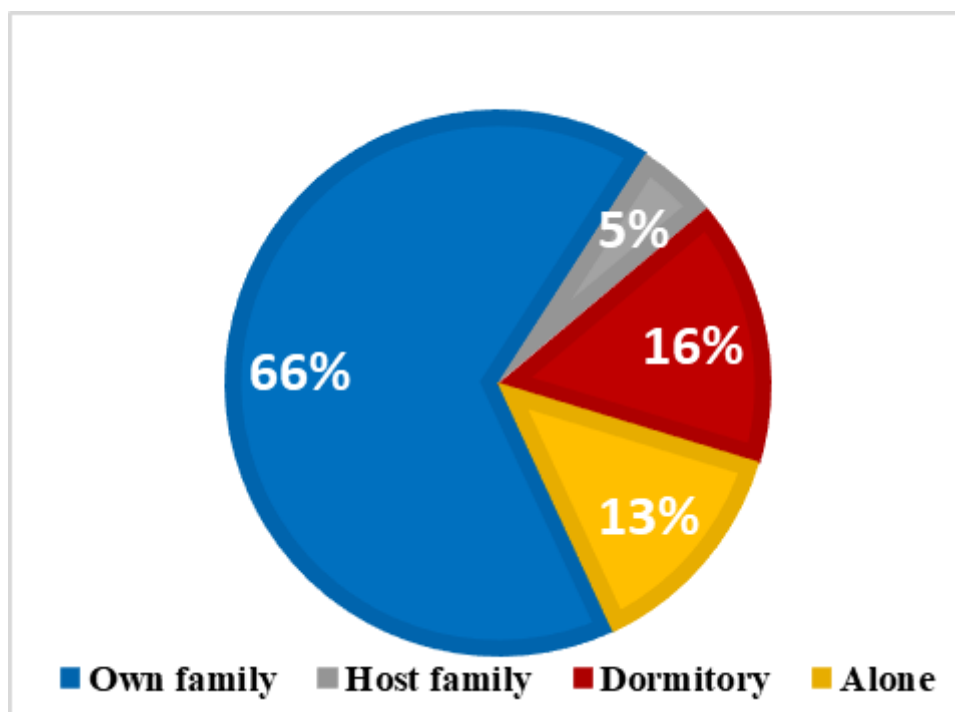


Figure 1

Distribution of participants according to their residency.