



































Table 5. The impact of the economic crisis on the lifestyle behaviours.

		Caffeine Consumption					-	Smoking Habits						Physical Activity						
		Don't Know	Drinking Less	No Changes	Quit Drinking	Started Drinking		P-value	Don't Know	No Changes	Quit Smoking	Smoking Less	Smoking More	Started Smoking	P-value	None	Once	2-4 Days	More than 5	Don't Remember
Age	18-25	30 (5.1%)	179 (30.7%)	274 (47.0%)	34 (5.8%)	66 (11.3%)	p<.001	130 (22.3%)	274 (47.0%)	80 (13.7%)	37 (6.3%)	39 (6.7%)	23 (3.9%)	p<.001	224 (38.4%)	127 (21.8%)	160 (27.4%)	43 (7.4%)	29 (5.0%)	p<.001
	26-35	18 (14.2%)	40 (31.5%)	44 (34.6%)	1 (0.8%)	24 (18.9%)		35 (27.7%)	51 (40.2%)	0	41 (32.3%)	0	0		51 (40.2%)	25 (19.7%)	29 (22.8%)	4 (3.1%)	18 (14.2%)	
	>36	5 (16.1%)	0	0	24 (77.4%)	2 (6.5%)		5 (16.1%)	10 (32.3%)	0	16 (51.6%)	0	0		24 (77.4%)	2 (6.5%)	0	0	5 (16.1%)	
Gender	Female	53 (8.3%)	175 (27.3%)	266 (41.5%)	65 (10.1%)	82 (12.8%)	p = 0.427	154 (24.0%)	297 (46.3%)	58 (9.0%)	77 (12.0%)	36 (5.6%)	19 (3.0%)	p = 0.123	259 (40.4%)	144 (22.5%)	146 (22.8%)	40 (6.2%)	52 (8.1%)	p = 0.168
	Male	11 (6.8%)	44 (27.2%)	76 (46.9%)	18 (11.1%)	13 (8.0%)		32 (19.8%)	84 (51.9%)	22 (13.6%)	17 (10.5%)	3 (1.9%)	4 (2.5%)		64 (39.5%)	27 (16.7%)	51 (31.5%)	9 (5.6%)	11 (6.8%)	
Family income	<1,500,000	9 (6.1%)	27 (18.2%)	97 (65.5%)	9 (6.1%)	6 (4.1%)	p<.001	43 (29.1%)	78 (52.7%)	7 (4.7%)	0	13 (8.8%)	7 (4.7%)	p<.001	36 (24.3%)	36 (24.3%)	48 (32.4%)	19 (12.8%)	9 (6.1%)	p<.001
	1,500,000-3,000,000	21 (7.1%)	75 (25.3%)	156 (52.5%)	17 (5.7%)	28 (9.4%)		86 (29.0%)	136 (45.8%)	50 (16.8%)	0	9 (3.0%)	16 (5.4%)		92 (31.0%)	62 (20.9%)	99 (33.3%)	24 (8.1%)	20 (6.7%)	
	3,000,000-5,000,000	14 (7.4%)	85 (44.7%)	39 (20.5%)	8 (4.2%)	44 (23.2%)		25 (13.2%)	80 (42.1%)	23 (12.1%)	57 (30.0%)	5 (2.6%)	0		109 (57.4%)	40 (20.1%)	25 (13.2%)	2 (1.1%)	14 (7.4%)	
	>5,000,000	20 (11.9%)	32 (19.0%)	50 (29.8%)	49 (29.2%)	17 (10.1%)		32 (19.0%)	87 (51.8%)	0	37 (22.0%)	12 (7.1%)	0		86 (51.2%)	33 (19.6%)	25 (14.9%)	4 (2.4%)	20 (11.9%)	
Education	Senior high or below	0	119 (100.0%)	0	0	0	p<.001	0	0	57 (47.9%)	0	39 (32.8%)	23 (19.3%)	p<.001	119 (100.0%)	0	0	0	0	p<.001
	Bachelor's degree	0	100 (19.0%)	248 (47.1%)	83 (15.8%)	95 (18.1%)		28 (5.3%)	381 (72.4%)	23 (4.4%)	94 (17.9%)	0	0		204 (38.8%)	171 (32.5%)	151 (28.7%)	0	0	
	Master's degree	46 (32.9%)	0	94 (67.1%)	0	0		140 (100.0%)	0	0	0	0	0		0	0	46 (32.9%)	49 (35%)	45 (32.1%)	
	PHD/MD	18 (100.0%)	0	0	0	0		18 (100.0%)	0	0	0	0	0		0	0	0	0	18 (100.0%)	

(Table 5) contd....

		Caffeine Consumption					-	Smoking Habits					Physical Activity								
		Don't Know	Drinking Less	No Changes	Quit Drinking	Started Drinking		P-value	Don't Know	No Changes	Quit Smoking	Smoking Less	Smoking More	Started Smoking	P-value	None	Once	2-4 Days	More than 5	Don't Remember	P-value
Field of Study	Health Bio Related	0	219 (38.4%)	174 (30.5%)	83 (14.5%)	95 (16.6%)	p<.001	0	335 (58.7%)	80 (14.0%)	94 (16.5%)	39 (6.8%)	23 (4.0%)	p<.001	323 (56.6%)	171 (29.9%)	77 (13.5%)	0	0	p<.001	
	Non health related	22 (11.6%)	0	168 (88.4%)	0	0		144 (75.8%)	46 (24.2%)	0	0	0	0		0	0	0	120 (63.2%)	49 (25.2%)		21 (11.1%)
	Other	42 (100.0%)	0	0	0	0		42 (100.0%)	0	0	0	0	0		0	0	0	0	0		0
Employment	Other	0	0	2 (18.2%)	7 (63.4%)	2 (18.2%)	p<.001	0	11 (100.0%)	0	0	0	0	p<.001	7 (63.6%)	4 (36.4%)	0	0	0	p<.001	
	Private business	13 (16.5%)	20 (25.3%)	34 (43.0%)	0	12 (15.2%)		23 (29.1%)	36 (45.6%)	0	20 (25.3%)	0	0		25 (31.6%)	15 (19.0%)	24 (30.4%)	2 (2.5%)	13 (16.5%)		
	Private sector employee	19 (18.6%)	0	39 (38.2%)	41 (40.2%)	3 (2.9%)		30 (29.4%)	56 (54.9%)	0	16 (15.7%)	0	0		41 (40.2%)	14 (13.7%)	24 (23.5%)	4 (3.9%)	19 (18.6%)		
	Public sector employee	1 (2.0%)	20 (48.0%)	8 (19.0%)	1 (2.0%)	12 (29.0%)		2 (5.0%)	19 (45.0%)	0	21 (50.0%)	0	0		26 (62.0%)	14 (33.0%)	1 (2.0%)	0	1 (2.0%)		
	Student	21 (4.0%)	179 (38.0%)	217 (45.0%)	26 (5.0%)	34 (7.0%)		105 (22.0%)	193 (40.0%)	80 (17.0%)	37 (8.0%)	39 (8.0%)	23 (5.0%)		205 (43.0%)	92 (19.0%)	123 (26.0%)	36 (8.0%)	21 (4.0%)		
	Unemployed	9 (10.0%)	0	40 (45.0%)	8 (9.0%)	32 (36.0%)		24 (27.0%)	65 (73.0%)	0	0	0	0		19 (21.0%)	31 (35.0%)	24 (27.0%)	7 (8.0%)	8 (9.0%)		
Region	Beirut	9 (6.0%)	25 (17.0%)	96 (66.0%)	9 (6.0%)	6 (4.0%)	p<.001	42 (29.00%)	78 (54.0%)	5 (3.0%)	0	13 (9.0%)	7 (5.0%)	p<.001	34 (23.0%)	36 (25.0%)	48 (33.0%)	18 (12.0%)	9 (6.0%)	p<.001	
	Bekaa	8 (5.0%)	37 (22.0%)	91 (54.0%)	14 (8.0%)	18 (11.0%)		43 (26.0%)	88 (52.0%)	28 (17.0%)	0	0	9 (5.0%)		51 (30.0%)	37 (22.0%)	57 (34.0%)	15 (9.0%)	8 (5.0%)		
	Mount Lebanon	11 (9.0%)	39 (31.0%)	64 (50.0%)	3 (2.0%)	10 (8.0%)		41 (32.0%)	47 (37.0%)	23 (18.0%)	0	9 (7.0%)	7 (6.0%)		42 (33.0%)	25 (20.0%)	40 (31.0%)	10 (8.0%)	10 (8.0%)		
	North	9 (20.0%)	10 (22.0%)	18 (40.0%)	4 (9.0%)	4 (9.0%)		18 (40.0%)	17 (38.0%)	6 (13.0%)	0	4 (9.0%)	0		14 (31.0%)	7 (16.0%)	13 (29.0%)	2 (4.0%)	9 (20.0%)		
	South	27 (8.5%)	108 (34.0%)	73 (23.0%)	53 (16.7%)	57 (17.9%)		42 (13.2%)	151 (47.5%)	18 (5.7%)	94 (29.6%)	13 (4.1%)	0		182 (57.2%)	66 (20.8%)	39 (12.3%)	4 (1.3%)	27 (8.5%)		

**Table 6. The impact of the economic crisis on the anxiety level of the Lebanese population.**

		Anxiety			P-value
		0-4 No to Minimal Anxiety	5-6 Moderate Anxiety	7-9 Mild to Severe Anxiety	
Age	18-25	95 (16.3%)	150 (25.7%)	338 (58.0%)	p<.001
	26-35	0	0	127 (100.0%)	
	>36	0	0	92 (100.0%)	
Gender	Female	76 (11.9%)	115 (18.0%)	449 (70.2%)	0.565
	Male	19 (11.7%)	35 (21.6%)	108 (66.7%)	
Marital status	Married	95 (53.1%)	84 (46.9%)	0	p<.001
	Not married	0	66 (10.6%)	557 (89.4%)	
Education	Senior high or below	95 (79.8%)	24 (20.2%)	0	p<.001
	Bachelor's degree	0	112 (21.3%)	414 (78.7%)	
	Master's degree	0	11 (7.9%)	128 (92.1%)	
	PHD/MD	0	3 (16.7%)	15 (83.3%)	
Employment	Other	0	0	11 (100.0%)	p<.001
	Private business	0	0	79 (100.0%)	
	Private sector	0	0	101 (100.0%)	
	Public sector	0	0	42 (100.0%)	
	Student	95 (19.9%)	150 (31.4%)	232 (48.6%)	
	Unemployed	0	0	89 (100.0%)	
Family income	<1,500,000	271 (18.2%)	66 (44.6%)	55 (37.2%)	p<.001
	1,500,000- 3,000,000	68 (22.9%)	7 (2.4%)	222 (74.7%)	
	3,000,000 - 5,000,000	0	65 (34.2%)	125 (65.8%)	
	>5,000,000	0	12 (7.2%)	155 (92.8%)	
Region	Beirut	25 (17.2%)	66 (45.5%)	54 (37.2%)	p<.001
	Bekaa	37 (22.0%)	0	131 (78.0%)	
	Mount Lebanon	33 (26.0%)	6 (4.7%)	88 (69.3%)	
	North	0	10 (22.2%)	35 (77.8%)	
	South	0	68 (21.5%)	249 (78.5%)	

**Table 7. The correlation between anxiety and smoking.**

		Anxiety			P-value
		0-4 No to Minimal Anxiety	5-6 Moderate Anxiety	7-9 Mild to Severe Anxiety	
Smoking habits	Don't know	0	18 (9.7%)	168 (90.3%)	p<0.001
	No changes	0	48 (12.6%)	333 (87.4%)	
	Quit smoking	49 (61.3%)	31 (38.8%)	0	
	Smoking less	0	37 (39.4%)	57 (60.6%)	
	Smoking more	22 (56.4%)	17 (43.6%)	0	
	Started smoking	23 (100.0%)	0	0	

The study found that 81% of the Lebanese young population earning the least income have decreased their fast food consumption. The finding was comparable to that of Icelandic research [23]; however, it contradicted findings from the United Kingdom. This could be due to the cost of fast food and the shift towards home-cooked meals. The study also found that participants had not changed their consumption of homemade food, indicating that the reduction in fast food consumption is a possible explanation. This conclusion is consistent with UK evidence [24]. Moreover, it was found that the consumption of unhealthy snacks like chocolate, chips, and crackers has decreased, similar to South Africa's data [25], despite inconsistent data from the USA [26] and Italy [27]. Besides, soft drink purchases decreased, which corresponded with findings from South Africa [25] and Iceland [23]. These aforementioned items have likely dropped since they were deemed non-essential during the economic downturn. Lowering the consumption of these items might be beneficial to one's health.

On top of that, our study suggests that an economic downturn may affect meat consumption positively since excessive meat consumption can lead to obesity, circulatory system diseases, and certain types of cancer [28]. Meat consumption declined dramatically during the recession, particularly for those with the lowest incomes and those living in households with more than five individuals. This drop might be attributed to low-income households considering meat as a luxury item due to its high price. While the data from our study correlate with other studies conducted in Bulgaria [29], Indonesia [16], and Spain [30], it is not consistent with studies conducted in the UK [24] and Portugal [31]. Evidence from a Polish study revealed that although total meat consumption was low, cheaper meat varieties like chicken were increasing [32]. Although the findings of the study indicated that the consumption of chicken had decreased by 25-50%, it remained considerably lower than the consumption of meat, particularly in large households with more than five individuals. Chicken's affordability may be attributed to its local origin. Consumption of seafood has decreased by 25% since before the financial crisis, especially in large

households with more than five members and those with the lowest income. Increased responsibility and the perception of seafood as a non-essential product are the reasons for this reduction. The results are in opposition to US and Polish research [33, 34]. Animal-based proteins, including chicken, meat, and seafood, were in decline as a consequence of the economic crisis related to the shortage of electricity. This may be explained by the lack of freezers, as demonstrated by a related study conducted in Greece [35].

In terms of legumes, more than half of the young population, especially those without employment, raised their consumption of legumes to more than 75%. Legumes provide an inexpensive alternative protein source during financial crises, which might explain why 63% of Beirut residents reported that the crisis did not alter the consumption of legumes. Comparable findings were found in Spain [36] and Portugal [31]. Along with that, most participants did not alter their rice and pasta consumption habits. Spanish research found a limited impact of the economic crisis on rice and pasta consumption [37]. This may be due to an increased understanding of household necessities' costs and the fact that carbohydrate-based foods are less expensive than protein-based items like meat and chicken. Nearly half of the middle-income young population, specifically 45%, did not change their consumption of rice and pasta. Furthermore, this could be attributed to the longer-lasting fullness provided by carbohydrate-based foods. The findings on rice intake align with Indonesian studies [16] but are different from those of a South African study [25]. Denmark's study, which found no variation in the use of carbohydrate-based products, is comparable to our results [38].

Commercially manufactured bread consumption was anticipated to drop during the economic crisis due to concerns in the agriculture sector, resulting in higher pricing [12, 29]. However, Lebanese households with five or more members continued to consume the same amount of bread, possibly due to having stored flour for fresh bread making or as a necessity for their daily diet. The findings align with data from Portugal [31] but contradict a Bulgarian study [29]. Furthermore, the Lebanese young

population continued to consume the same dairy products in nearly half (45%) of the lowest-income households. Additionally, 36% of those with the least income did not change their consumption due to purchasing unpasteurized milk and producing homemade dairy items. This contradicts a study in Greece [35] and Russia [39], which found that participants with the least income during an economic recession decreased their milk consumption. The current study demonstrated similar egg consumption before the economic crisis, particularly among those with lower incomes and small households with only one or two individuals. This could be due to the ownership of chickens and the lack of responsibility in small-sized households, which may have fewer eggs for consumption.

Apparently, as a result of the high expense of home fruit cultivation, the research conducted found that fruit consumption in Lebanon remained unchanged despite the economic crisis. This result is in agreement with other research performed in Portugal [31] and Spain [30, 36]. Despite the assumption that vegetable intake would remain constant in rural regions, vegetable consumption in Beirut remained consistent, particularly among those with the lowest incomes. This is because vegetables are regarded as a necessary, low-cost item in every home for a balanced meal.

Another significant impact is changes in grocery purchasing and nutritional quality, affecting caloric intake and influencing human health and nutrition. Individuals with the lowest incomes (below 1,500,000 L.L.), those with households of more than five, and those without USD income have decreased their consumption of nuts by 25% compared to before the crisis. This is likely due to increased prices for nuts, making them unaffordable for the young Lebanese population. The purchase of vegetable oil by married couples remained stable. Employees in the private sector and those with their own enterprises observed a minor decline in vegetable oil purchases, ranging from 50 to 75%, probably due to the importance of vegetable oil as a domestic cooking component. The purchasing of olive oil has seen a significant decline, with public and private sector employees, as well as unemployed individuals, experiencing a 25% decrease in purchasing due to the high cost. The South's young population also reported a 25% decrease in purchasing due to their own olive tree fields and the ability to produce their own oil. With respect to butter purchasing, the study found that nearly half of married couples did not change their butter purchases, possibly due to the availability of cheaper alternatives like margarine. However, those with the least income reported a decline in butter purchases, with 25–50% of them declining, possibly because they do not view butter as a cheaper fat source alternative. Nevertheless, no studies were found that aligned with these results.

Our findings suggest that married couples continued to purchase teabags and sugar at the same rate. A study carried out in South Africa found that 100% of the population did not change their purchasing patterns for teabags and sugar [25]. Perhaps due to their preference

for tea, it is known that it is less expensive than coffee. However, a decrease (25–50%) in purchasing sugar was seen among the unemployed and public sector participants (39.3% and 33.9%, respectively). This is because the Banque du Liban has stopped providing subsidies for sugar, leading to increased sugar prices and a decrease in sugar purchases among them. The same outcomes were observed regarding coffee purchasing among unemployed respondents and public sector employees, with a drop observed from 25–50%. This outcome may be explained by higher coffee costs and strikes during periods of economic crisis.

The economic crisis can affect diet quality [40], leading to inequalities in access to nutritious food due to scarce resources [41]. A high-energy diet produces more energy than a low-energy one, as healthy diets are considered more expensive. A study in Spain found that the economic crisis can lead to weight gain [42], contradicting the current findings. Middle-income individuals' snack and fast-food consumption have decreased by 25% compared to pre-economic times, with BMI levels considered normal at 18.5–24.9 kg/m<sup>2</sup>. This decline is attributed to the lack of affordability of snacks and the increased cost of fast food, along with the deteriorating quality and safety of restaurant food. Homemade food consumption has remained relatively stable, with most individuals reporting no changes in their consumption. This contradicts a Spanish study that found snacking increases during a recession, leading to increased obesity levels [43].

Furthermore, a period of downturn shifts lifestyle habits, including smoking, caffeine consumption, and physical activity. Economic crises can both positively and negatively impact lifestyles, according to studies performed in Iceland [23] and the USA [44]. Smoking behaviour has been a topic of conflicting outcomes. Our study found that a minority of respondents, particularly those aged 18–25, shifted towards smoking, similar to Spain [47]. Besides, public sector workers also started to smoke less due to increased cigarette prices, which is comparable to a study conducted in Greece [45]. However, those with less education and income started smoking more, similar to research carried out in the Netherlands [46] and Spain [30]. During the recession, these groups were most exposed to stress. Caffeine consumption remained constant in over half of the young population, with most quitting occurring in individuals over 36 years and middle-aged individuals (26–35 years). This may be due to anxiety during stressful times due to managing additional obligations to maintain basic needs. In South Lebanon, only a small percentage of the young population decreased their caffeine consumption, possibly due to their preference for it during free time. Regarding physical activity, it was anticipated that residents would exercise more, especially walking and cycling, due to the fuel crisis that hit Lebanon. However, this was not the case for all socio-demographic groups. The crisis, which served as a persistent stressor, may have played a separate, supplementary function in encouraging physical activity among the young population. Data suggest that

27.4% of individuals aged 18–25 participated in physical activity 2–4 days per week due to being more active and walking instead of using cars due to the fuel crisis. Additionally, 62% of the young population with a private business participated in physical activity 2–4 days per week, as they could earn US dollars and register at gyms. These findings align with data from Spain [30]. Additionally, participants in the public sector with the least income or who were unemployed did not engage in physical activity, possibly due to a loss of interest in their surroundings due to the new circumstances they had to adapt to. This contrasts with the results in Greece, where low-income individuals participated in moderate physical activity due to increased fuel prices [46].

Economic crises can lead to increased stress and anxiety among individuals, particularly in Lebanese society. Persistent stress can develop into chronic stress [47, 48], and a majority of socio-demographic categories experience high levels of anxiety due to job uncertainty [49]. The study found that all participants aged 26–35 with a Master's degree admitted to having serious anxiety disorders. This age group is more likely to experience high levels of anxiety due to job loss or lack of available jobs after years of hard work and study. Comparable to studies conducted by Gili *et al.* (2012) [50] and Astell-Burt & Feng (2013) [51], our study showed that married individuals in Lebanon experienced little to no anxiety; the most likely explanation is due to their husbands working abroad and providing monthly income in US dollars. During economic downturns, individuals with low salaries are more likely to experience severe anxiety as they adjust to their new circumstances. As well, males were more likely to have extreme levels of anxiety, most likely due to their financial support for their families.

In a study that investigated the correlation between smoking and anxiety levels, it was shown that smoking affects stress levels [52]. Higher anxiety levels were seen in respondents who smoked less. As well, 56.4% of participants who started smoking more and 100% of those who started smoking did not experience anxiety. Thus, one plausible explanation for this result might indicate that the respondent began smoking as a way to vent the stress caused by the crisis. Further, the COVID-19 pandemic has exacerbated public health crises, causing mental health issues like anxiety and stress, resulting in changes in behavioural practices. For example, alcohol consumption rose during the epidemic, indicating changes in health-related behaviours [53, 54]. Our study, conducted after the COVID-19 pandemic, underscores the significant impact of the pandemic on mental health, behavioural habits, and health-related practice, emphasizing the importance of focused interventions to address these issues.

It's worth mentioning that this study's exclusive emphasis on the young Lebanese population, aged 18 to 25, means that it may not be entirely representative of the country's population overall. This is an important limitation of the research.

## CONCLUSION

The economic crisis in Lebanon has had a considerable

influence on the young population's eating habits and lifestyle, resulting in a shift towards less nutritious, more affordable food alternatives and a priority of fundamental requirements over discretionary expenditure. The study demonstrates that the economic crisis cannot be entirely viewed positively or negatively in terms of dietary behaviour. Additionally, the consequences have been exacerbated by the stress and anxiety associated with the downturn. Policymakers and stakeholders must address these concerns and work towards long-term solutions to improve the well-being of the young Lebanese population.

## AUTHORS' CONTRIBUTION

All authors designed the study, analyzed and interpreted the data, and drafted the manuscript with equal contributions at all levels. The authors have accepted responsibility for the entire content of this manuscript and have approved its submission.

## LIST OF ABBREVIATIONS

WHO	=	World Health Organization
FAO	=	The Food and Agriculture Organization
SPSS	=	Statistical Package for Social Services
USD	=	United States Dollar
L.L.	=	Lebanese Lira
US	=	United State

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was reviewed and approved by the Lebanese International University Institutional Review Board (IRB) ethical committee, Lebanon (Reference LIUIRB-220201-IS-113).

## HUMAN AND ANIMAL RIGHTS

The study involved only human subjects, with no involvement of animals. All participants provided informed consent through a questionnaire, which included a consent form that ensured confidentiality, anonymity, and voluntary participation.

## CONSENT FOR PUBLICATION

Informed consent was obtained from participants to participate in the study.

## STANDARDS OF REPORTING

STROBE guidelines were followed.

## AVAILABILITY OF DATA AND MATERIALS

The data and supportive information will be available by the corresponding author [I.S] upon request.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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