An evaluation of level of knowledge, behaviour and attitude towards environmental footprint in secondary school students in Libya

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Abstract

The indications of the impact of activities of people on environment are called footprints. Footprints are targeting various concerns related with environment and they quantify resource appropriation or waste generation, or both. Knowledge on protecting environment is one of the important factor that may affect environment adversely, because knowledge determines attitudes and behaviours of someone to environment. This study aimed to assess knowledge, attitudes and behaviours of Libyan secondary schools students towards environmental footprint. A quantitative research employing a questionnaire including questions on demographic characteristics of students and 35 questions on student’s knowledge, attitudes and behaviours of students towards environment was carried out. Data were collected from 400 students in the last quarter of 2018 in four secondary schools located in Tripoli. Data were analysed using Statistical Package for Social Sciences, SPSS vs. 21, employing both descriptive and inferential statistical techniques. Majority of students (91.8%) were observed as having high knowledge on environmental footprint. A higher proportion of students were having moderate levels of attitudes (76.0%) and behaviours (65.8%) towards environment. When the impact of demographic characteristics on level of knowledge, attitudes and behaviours was studied using t-test, it was found that students whose fathers were graduated from master or PhD had significantly greater knowledge level compared to others. It is important to implement programmes for improving knowledge of different parts of population by both empowering school curriculum and involving public and private sectors for involving in policies and programmes for both improving knowledge of different population groups and encouraging them to safe behaviours towards environment.

1. Introduction

Traces of the effect of activities by populations in the environment are defined as environmental footprint. There are two main types of footprint, namely environmental footprint and carbon emissions related footprint. Environmental footprints have a very wide range, because it includes many areas of human activities in the environment. Environmental footprint involves the arithmetic of assessing the human utilization of environmental endowments in relation to the effects on the immediate environment; the concept assesses or weights the nature endowments utilization with regards to natural supply of such endowments; these could be applicable to single person, households, people, settlements, academic populations of various categories, municipal areas, states and countries across the world. A number of environmental concerns may therefore be related to footprints and to reduce these concerns appropriate
resource allocation and improvement of waste generation are required [1,2]. Environmental footprint, in addition, includes the indications of consumption of populations on the entire world, bio-diversity endowments on the biosphere, hydrosphere, and atmospheric environment. Government, non-governmental organizations and formal business organizations must consider the people consumption amounts in the way that if people consumption exceeds the environmental carriage capacity rate, the environmental problems will increase [3]. Since in the today's world there are huge amount of activities of industries, high technology advancement, increase in the number of population and the expansion of cities on wide areas are increasing the requirements of research on environmental footprint and viable sustainable life [4].

The level of knowledge on how to protect environment is one of the important factor that can affect environment negatively. The reason for this is because knowledge is an important factor that determines people's attitudes and behaviours against environment. Person related institutional factors and socioeconomic status; for example, age, ethnicity, gender, education status and income level of people, can impact the knowledge and attitudes of people towards environmental concerns [5]. It is also discussed that knowledge on protecting environment is also important in raising awareness on environment. It was stated that awareness on the environment is about know people realize and get to know information about the environment. Supportive efforts must be given to encourage people for contributing to finding solutions to environmental positions. It was further shown in the evidence that the awareness on the environment significantly changes based on the sex, age, education, household income, source of environmental information [6,7].

Proving knowledge on how to behave environmentally friendly can help changing attitudes of people towards environment and attain behaviours that are towards protecting environment. Reduced or lack of knowledge on the environment and importance of protecting it is an important concern and can be overcome by providing education or training on importance of protecting environment [8,9,10]. There are further emphases on the importance of enhancing knowledge of young populations regarding environment. It is important to assess the knowledge level of young people on environment and implement tailored environmental programmes to increase awareness of young towards environmental problems and assist them in relating the knowledge they gained to their actions and attitudes. There are wide evidence on to control ecological conditions, interactive teaching methods must be used for enhancing knowledge on protecting environment in young populations and children [11,12,13].

The main aim of this study was to evaluate knowledge, behaviour and attitude of the Libyan secondary school students towards environmental footprint and sustainable life based on their demographic characteristics, such as gender differences, age, nationality, educational background of the father, educational background of mother and income level of the family.

2. Methodology

2.1. Study Setting and Participants

This research aimed to evaluate knowledge, attitude and behaviour of students regarding environmental footprint and sustainable life in four selected secondary schools in Tripoli Metropolitan City, Libya. In Libya students aged between 16 to 18 years are given education in schools called secondary schools. Students studying in secondary schools were targeted and based on the number of total populations of schools, the representative population sample size was determined as 400 to attain 95% confidence level and 5 confidence interval in the results obtained. As the number of target population size was similar in each school, 100 students were involved in each school. The response rate to the questionnaires circulated in each school were 100%.
2.2. Study tool
The survey tool compromising questions on demographic information and a sum of thirty-five questions, including questions addressing knowledge, attitude and behaviour on environmental footprint and sustainable life was used. The questionnaire was adapted from the research of Meyer, 2009 and it was translated into Libyan Language using a back to back translation method. There were 24 questions assessing knowledge; 17 questions assessing attitude and 13 questions assessing behaviours towards environmental footprint. The responses to questions were employing using five Likert scales to provide uncompromising options for the respondents in all the questions that are stipulated in the questionnaire (Strongly agree 1; Agree 2; Neutral 3; Disagree 4, and Strongly disagree 5). The questionnaire was approved for the level of understanding by three expertise in the area and for improved validity reverse questions were involved in the questionnaire.

2.3. Data collection
The collection of data was done in the last quarter of 2018. The required permissions were arranged prior to the visits to schools. The students were involved in an orientation program before the data collection to socially motivate and educate them to enable them express their selves in accordance with the objectives and research questions of the particular study. The study methodology and the tool to be used was approved by the Ethical Committee of the European University of Lefke.

2.4. Data analysis techniques
The data collected during the course of this study were processed and analysed using the Statistical Package for Social Sciences, SPSS v21. The validity of the statistical tool was first evaluated by using the responses from 15 students and Cronbach Alpha value was formulated for assessing the validity. The Cronbach Alpha value was 0.87, which was greater than 0.7 that is used as a threshold value for determining how valid the tool is. After the data were collected from all targeted students, the data were entered in to the statistical package and assessed for any missing data and data were organized before the analysis. During the data processing, the data were assessed against normality using Skewness and Kurtosis tests and frequency distribution charts. Whilst scores on attitude and behaviour towards environmental footprint were normally distributed (Skewness and Kurtosis scores close to 0), knowledge scores were not distributed normally in the study sample. Data analyses were done using descriptive statistics, including frequency tests, distributions graphics, Student’s T-test. Inferential statistical technique, ANOVA (Analysis of Variance) was used for testing the statistical difference in level of knowledge, attitude and behaviour by different demographic characteristics. Since knowledge scores were not normally distributed, the reciprocal of knowledge scores were taken, which distributed the data normally. P-values of less than and equal to 0.05 (≤ 0.05) were accepted as statistically significant.
3. Results

3.1. Characteristics of study population

The study was performed on overall 400 secondary school students, most of which were female (83.3%) and aged 16 years (40.8%) (Table 1). Majority of students were Libyan (96.8%) and approximately half of the students have low family income earning 500 to 1000$ a month.

Table 1. Characteristics of students studying in four secondary schools in Tripoli Metropolitan City, Libya

| Characteristics                      | Frequency | Percent |
|--------------------------------------|-----------|---------|
| Gender                               |           |         |
| Male                                 | 67        | 16.8    |
| Female                               | 333       | 83.3    |
| Age                                  |           |         |
| 16                                   | 163       | 40.8    |
| 17                                   | 102       | 66.3    |
| 18                                   | 135       | 33.8    |
| Nationality                          |           |         |
| Libya                                | 387       | 96.8    |
| Other                                | 13        | 3.3     |
| Education status of father           |           |         |
| Has not been graduated from primary school | 20       | 5.0     |
| Primary school                       | 50        | 12.5    |
| Secondary school                     | 98        | 24.5    |
| University/Faculty                   | 194       | 48.5    |
| Master/PhD                           | 38        | 9.5     |
| Monthly income of the family         |           |         |
| 500-1000$                            | 188       | 47.0    |
| 1001-2000$                           | 75        | 18.8    |
| 2001-3000$                           | 34        | 8.5     |
| > 3000$                              | 103       | 25.8    |
| Total                                | 400       | 100     |
3.2. Level and ranking of knowledge, attitude and behaviours towards environmental footprint:
The scores from the questions on each dimensions, namely knowledge, attitude and behaviours towards protecting environment were calculated by summing up the scores from the marks in likert scales. Questions having positive and negative responses were determined and they were scored based on the state of the responses: negative responses were marked inversely. The average score was 39.5 (38.9-40.2) for knowledge; 34.1 (33.5-34.7) for behaviour and 43.3 (42.6-44.0) for attitude. The level of three dimensions were ranked based on the ranking scale shown in Figure 1. Since Likert scale was ranked from 1 to 5, from positive to negative responses (Strongly agree to Strongly disagree), smaller scores of dimensions indicate better scores for knowledge, attitude and behaviours. For example; a score of knowledge between 24 and 48 indicate good knowledge towards environmental footprint and was shown as rank 1 for knowledge.

| Knowledge | 24 | 48 | 72 | 96 | 120 |
|-----------|----|----|----|----|-----|
| Attitude  | 17 | 34 | 51 | 68 | 85  |
| Behavior  | 13 | 26 | 39 | 52 | 65  |

*Figure 1. Linear Scales Rating for Knowledge, Attitude and Behaviour towards environmental footprint*

The frequency distributions for level of knowledge, attitude and behaviour towards environmental footprint and sustainable life are given in the Table 2. In the Libyan secondary school students, it was shown that the level knowledge on environmental footprint and sustainable life was high, with most of the students having high level of knowledge (91.8%) and moderate level of attitude (76.0%) and behaviour (65.8%) regarding environmental footprint (Figure 2a to c).
Figure 2a. The ranking of level of knowledge in students studying in secondary schools in Libya

Figure 2b. The ranking of level of attitude in students studying in secondary schools in Libya
3.3. The relationship between demographic characteristics of students and knowledge, attitude and behaviour on environmental footprint

The level of knowledge in secondary school students was not significantly but greater in those aged 17 years compared to those aged 16 years (mean score of $40.578 \pm 7.712$ compared to $38.871 \pm 6.915$, p-value $= 0.063$). Students whose fathers were master or PhD graduates were shown as having higher knowledge on environment compared to those having fathers graduated from secondary school only ($41.105 \pm 7.082$ in those having fathers graduated from a masters or PhD degree compared to $39.061 \pm 6.192$ in students whose fathers were secondary school graduates, p-value: $0.05$). Students having better income level were shown as having lower knowledge compared to those having lower income ($36.824 \pm 6.293$ in those having $2001-3000$ monthly income compared to $39.840 \pm 6.498$ in those having $500-1000$ monthly income, p-value $= 0.013$). The behaviour on environment was shown to be better in Libyan students compared to others ($34.199 \pm 6.124$ in Libyan students compared to $30.769 \pm 6.760$, p-value: $0.048$ in students from other origins). There was no difference in the mean level of attitude with different demographic characteristics.

Inferential statistics using ANOVA test were performed to test the differences in the level of knowledge, attitudes and behaviours among the students with different demographic characteristics (Table 3). There was no statistically significant difference in the level of knowledge and any demographic characteristics, except the level of income of the family of students. Those having lower income level were shown as having better knowledge than those having higher income levels (p-value $= 0.05$). Although there was no difference shown in attitude of students towards environmental footprint between any demographic group, inferential test have shown significant difference. Those from other nationalities had lower level of attitudes towards environment compared to Libyan students (p-value $< 0.05$).
Table 2. The differences in knowledge, attitudes and behaviours of students between different population groups using Student’s t-test

| Characteristics          | Knowledge |          |          | Attitude |          |          | Behaviour |          |          |
|--------------------------|-----------|----------|----------|----------|----------|----------|-----------|----------|----------|
|                          | X (±sd)   | t        | p-value   | X (sd)   | t        | p-value   | X (sd)   | t        | p-value  |
| Gender                   |           |          |          |          |          |          |           |          |          |
| Male                     | 40.269    | 0.000    | 0.000    | 43.507   | 0.258    | 0.796    | 34.328    | 0.350    | 0.727    |
| Female                   | 39.423    | 0.928    | 0.354    | 43.261   | 0.258    | 0.796    | 34.039    | 0.350    | 0.727    |
| Age                      |           |          |          |          |          |          |           |          |          |
| 16*                      | 38.871    | 0.000    | 0.000    | 42.509   | 0.000    | 0.000    | 33.601    | 0.000    | 0.000    |
| 17                       | 40.578    | 1.870    | 0.063    | 43.863   | 1.467    | 0.144    | 34.588    | 0.350    | 0.727    |
| 18                       | 39.659    | 1.068    | 0.287    | 43.837   | 1.068    | 0.287    | 34.296    | -0.990   | 0.323    |
| Nationality              |           |          |          |          |          |          |           |          |          |
| Libya*                   | 39.641    | 0.000    | 0.000    | 43.416   | 0.000    | 0.000    | 34.199    | 0.000    | 0.000    |
| Other                    | 37.539    | 1.107    | 0.269    | 39.923   | 1.746    | 0.082    | 30.769    | 1.980    | 0.048    |
| Education status of      |           |          |          |          |          |          |           |          |          |
| father                   |           |          |          |          |          |          |           |          |          |
| Has not been graduated   | 37.846    | 1.100    | 0.274    | 40.000   | 1.614    | 0.110    | 32.923    | -0.772   | 0.442    |
| from primary school      |           |          |          |          |          |          |           |          |          |
| Primary school           | 39.302    | 0.737    | 0.463    | 44.186   | 0.334    | 0.739    | 34.000    | -0.409   | 0.683    |
| Secondary school*        | 40.317    | 0.000    | 0.000    | 40.317   | 0.000    | 0.000    | 34.494    | 0.000    | 0.000    |
| University/Faculty       | 40.317    | 0.262    | 0.793    | 43.573   | 0.152    | 0.879    | 34.405    | -0.103   | 0.879    |
| Master/PhD               | 38.113    | 1.979    | 0.050    | 42.325   | 1.264    | 0.208    | 33.188    | -1.356   | 0.177    |
| Education status of      |           |          |          |          |          |          |           |          |          |
| mother                   |           |          |          |          |          |          |           |          |          |
| Has not been graduated   | 40.050    | 0.614    | 0.541    | 43.700   | 0.240    | 0.811    | 34.150    | -0.108   | 0.914    |
| from primary school      |           |          |          |          |          |          |           |          |          |
|                      | Mean  | Standard Deviation | Mean  | Standard Deviation | Mean  | Standard Deviation | Mean  | Standard Deviation |
|----------------------|-------|--------------------|-------|--------------------|-------|--------------------|-------|--------------------|
| **Primary school**   | 40.640 | (6.546)            | 1.439 |                   | 43.340 | (7.935)            | 0.064 |                   |
| **Secondary school*  | 39.061 | (6.192)            | 0.000 |                   | 43.255 | (7.515)            | 0.000 |                   |
| **University/Faculty** | 39.206 | (6.808)            | 0.177 |                   | 43.217 | (6.230)            | 0.045 |                   |
| **Master/PhD**       | 41.105 | (7.082)            | 1.658 |                   | 43.605 | (7.332)            | 0.245 |                   |
| **Monthly income of the family** |     |                    |       |                    |       |                    |       |                    |
| **500-1000$**        | 39.840 | (6.498)            | 0.000 |                   | 43.617 | (7.083)            | 0.000 |                   |
| **1001-2000$**       | 40.560 | (7.795)            | 0.765 |                   | 43.080 | (7.555)            | 0.545 |                   |
| **2001-3000$**       | 36.824 | (6.293)            | 2.503 |                   | 42.441 | (7.093)            | 0.258 |                   |
| **> 3000$**          | 39.272 | (6.303)            | 0.721 |                   | 43.175 | (6.920)            | 0.514 |                   |
Table 3. ANOVA test results assessing the differences in demographic characteristics and level of knowledge, attitude and behaviour regarding environmental footprint

| Characteristics          | Knowledge |          |          |          |          |          |          |
|-------------------------|-----------|----------|----------|----------|----------|----------|----------|
|                         | Mean Squares | p-value | Mean Squares | p-value | Mean Squares | p-value |
| Gender                  |            |          |            |          |            |          |
| Intergroup              | 39.004     | 0.354    | 3.381     | 0.796    | 4.669     | 0.727    |
| Intragroup              | 45.389     | 0.354    | 50.741    | 0.796    | 38.109    | 0.727    |
| Age                     |            |          |            |          |            |          |
| Intergroup              | 91.202     | 0.131    | 86.584    | 0.181    | 35.002    | 0.399    |
| Intragroup              | 45.137     | 0.131    | 50.441    | 0.181    | 38.040    | 0.399    |
| Nationality             |            |          |            |          |            |          |
| Intergroup              | 55.592     | 0.269    | 153.454   | 0.082    | 147.950   | 0.048    |
| Intragroup              | 45.348     | 0.269    | 50.364    | 0.082    | 37.749    | 0.048    |
| Education status of father |          |          |            |          |            |          |
| Intergroup              | 75.493     | 0.155    | 69.799    | 0.239    | 28.621    | 0.558    |
| Intragroup              | 45.068     | 0.155    | 50.428    | 0.239    | 38.120    | 0.558    |
| Education status of mother |          |          |            |          |            |          |
| Intergroup              | 50.616     | 0.348    | 2.092     | 0.997    | 7.438     | 0.941    |
| Intragroup              | 45.320     | 0.348    | 51.114    | 0.997    | 38.335    | 0.941    |
| Monthly income of the family |          |          |            |          |            |          |
| Intergroup              | 117.625    | 0.050    | 16.405    | 0.809    | 4.381     | 0.952    |
| Intragroup              | 44.826     | 0.050    | 50.882    | 0.809    | 38.280    | 0.952    |
4. Discussion

4.1. Main findings of the study
This study aiming to evaluate the knowledge, attitude and behaviour of secondary school students was conducted on 400 secondary school students studying in four secondary schools in Tripoli Metropolitan City, Libya. Since male students are predominantly studying in the schools in Libya, the majority of students in the study sample were males (83.3%). A high proportion of students were Libyan and most of them were aged 17 years (66.3%). Whilst 91.8% of students were reported as having high knowledge level, 76.0% of them had moderate level of attitude and 65.8% of students had moderate level of behaviour on environmental footprint and sustainable life. The analysis on the correlation between demographic characteristics and level of knowledge, attitude and behaviour towards environmental footprint showed that students having lower income level had better level of knowledge compared to those who have better socioeconomic status. In only ANOVA test results, students from Libyan origin were shown as having better attitudes towards environment compared to others.

4.2. Explanation of results and comparison with previous evidence
Libyan students between the age of 16 to 18 years were predominantly observed as having good knowledge on environmental footprint and sustainable life. This may indicate that the information on protecting environment and sustainable life in secondary school curriculums are strong. It was stated previously that the education and learning on environmental concerns have been enhanced in today’s world and this enhancement in the knowledge on environmental concerns are expected to improve actions and attitudes that would help for solving environmental problems [14]. The ranking of level of attitudes towards environment have shown that the level of attitudes towards environment in the majority of students was moderate. In opposite to the evidence on the effectiveness of education on the environmental concerns enhancing attitudes towards environment [15,16], our results suggest that although students gain adequate knowledge on environmental risks and protecting environment, there would be gaps in applying the knowledge into attitudes towards environment. Behaviours towards environmental footprints were at moderate level, indicating that the good level of knowledge may not be reflected fully to adjust the unfriendly situations in the environment. Although students may gain adequate knowledge on the situations and actions dangerous for environment, they may not be encouraged to apply their knowledge into practices to behave friendly in the environment [17].

There are supporting evidence that socio-economic status, personal and psychological characteristics can lead to variations in the ecological attitudes of individuals in the environment [18,19]. These variations in attitudes are also reflected to behaviours, showing variations in behaviours of people towards matters related to environmental issues [20]. Empirical evidence is suggesting that unfavourable behaviours in the environment are highly observed in the males, younger people, those poorly educated, socioeconomically deprived people, and people living in rural regions [21]. It has also been reported earlier that morality and spiritual faith are also the factors that may be associated with the attitudes and behaviours towards environmental issues and environmental sustainability [22]. In opposite to the given evidence, the present study did not show any disparities in attitudes in those with different demographic characteristics. Knowledge on environmental issues was reported as related with the income level of families of the students. Evidence supports that those with better income earning tend to have better life styles, greater opportunities of having better education and more influence on the other people [23].

Studies have therefore shown that rich people have more concerns relative to environmental issues compared to other population groups [24]. Our findings, however, showed results that are opposing this evidence, with better knowledge on environmental footprint in those having lower income levels. This difference in the knowledge level between socioeconomic groups are probably due to the limitations in the data because the number of those having greater income level were low, probably leading to results, which are opposite to the empirical evidence.
5. Conclusions

Environmental footprint is the sign of the activities of human on environment. Since knowledge on the ways of protecting environment against environmental hazards is an important determinant of attitudes and behaviours towards environment, it is crucial to research the level of knowledge, attitudes and behaviours towards the environment and the factors that may influence these. The current research aimed at looking the level of knowledge towards environmental footprint in a young population using a sample from a secondary school in Libya. The study further evaluated the impact of level of knowledge on the attitudes and behaviours in environment in young people. It was overall shown that although level of knowledge was high in the study population, the level of behaviours and attitudes were lower, with most of the subjects having moderate levels of behaviours and attitudes towards environment. This may indicate that although level of knowledge on protecting environment is high, young people must be supported in their practices in the environment towards protecting it against environmental hazards.

There were no critical differences observed in knowledge, attitudes and behaviours towards environment in the different student groups in the study sample. Further research is required to assess any impact of demographic issues that influence the particular three dimensions crucial in reducing environmental footprints.

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