

Editorial

A Participatory Approach to Prevent Climate Change in Faculty of Medicine, Thammasat University

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Introduction

The aim of this medical students' research project was to evaluate the carbon footprint (CF) of students and departments in a university in Thailand and assess students' knowledge of climate change before and after learning activities.

Method

There were two parts in this study. Firstly, the CF was evaluated among third-year medical students from Thammasat University (TU) and three departments in the Faculty of Medicine. Students who expressed an interest in this project received an

online survey form that asked about daily activities: (i) Scope 1 was the direct CO₂ emission from fuel consumption for their transport, (ii) Scope 2 was the indirect CO₂ emission from electricity they used, and (iii) Scope 3 was other indirect CO₂ emission from paper and bottled drinking water bottle they used. We calculated CO₂ emission using the formula below.¹⁻³

$$\text{CO}_2 \text{ emission (kg CO}_2\text{e)} = \text{energy use in each activity (unit)} \times \text{emission factor (kg CO}_2\text{e/unit)}$$

For assessing CO₂ emissions from the three faculty departments, secondary data were obtained from the heads of each department, as shown in Table 1.

Table 1 Secondary data from each department with the emission factors for each activity

Department	secondary data	Emission factor
Education	Ink	2.5000 kg/CO ₂ eq./kg
	Paper	0.7350 kg/CO ₂ eq./kg
Transportation	Fuel used (diesel)	0.3282 kg/CO ₂ eq./unit
Laboratory	Chemical substances	Emission factor of each chemical
	Electricity use	and electricity

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The second part of the study was a series of learning activities for the medical students, which included open learning activities, brainstorming sessions about climate change, talks about CF and CF labelling, and presenting the CF results from the first part of this study followed by a discussion on how to reduce CO₂ emission.

Results

From 170 third year medical students, 70 of them (41.2%) participated in the survey. For the CF scope 1 evaluation, the main source of CO₂ emission was from fuel use with 43/70 students using their personal vehicles that consumed five types of fuel,

including gasohol, benzine 91, benzine 95, diesel, and biodiesel. The most commonly used fuel was benzine 95, accounting for approximately 96% (67/70). We also found that most students used motorcycles as the main vehicle. 15/70 and 12/70 students used bicycles and public NGV buss, respectively, as their main means of transport. We did factor these two types of transport in this study because they do not emit CO₂. For CF scope 2, CO₂ emissions mostly came from electricity use with 90% of electricity consumption for air-conditioners. CO₂ emissions in scope 3 came mostly from paper that was used for lectures. The mean CO₂ emission/student was 2.01 metric tons/year (Figure 1).

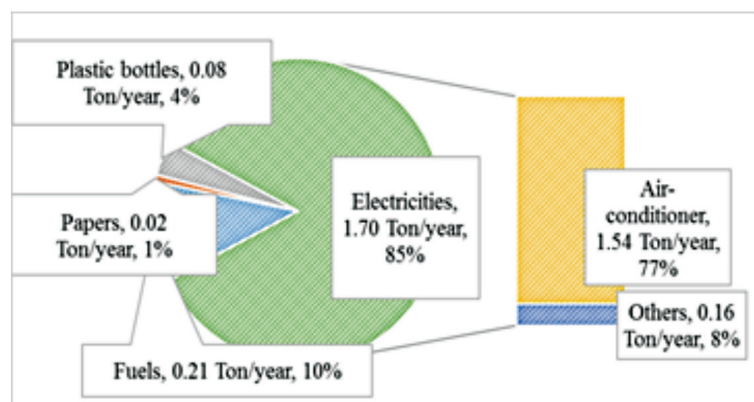


Figure 1 The carbon footprint from one student.

The results of the CF for the three departments are shown below.

1. Department of Education

1.1 Paper used

Paper consumption between 1st January and 31th December 2016 was 350 reams of A4 paper. The mean weight of paper use per month was 840 kg

(1 ream weights 2.4 kg), for a monthly CF 617.40 kg CO₂eq based on an emission factor of 0.735 kgCO₂eq/kg. Totally, the department used 3,300 reams over one year, corresponding to a weight of 7,920 kg and a total CF of 5,821.20 kgCO₂eq/year (Figure 2).

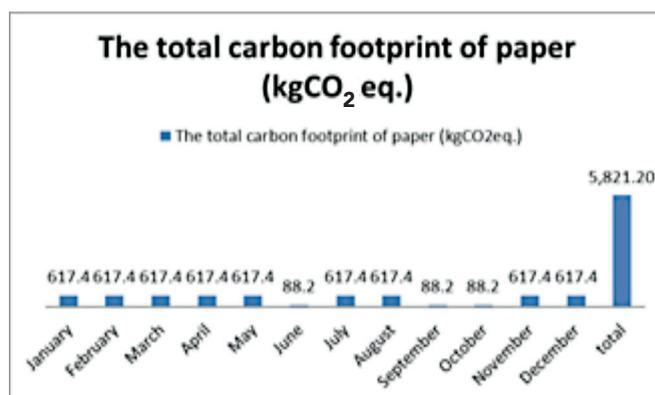


Figure 2 Total carbon footprint of paper.

1.2 Ink used

The amount of ink used in each month was two bottles. The total weight was 3.4 kg and the CF

was 8.50 kgCO₂eq/ month (total 102 kgCO₂eq per year) (Figure 3).

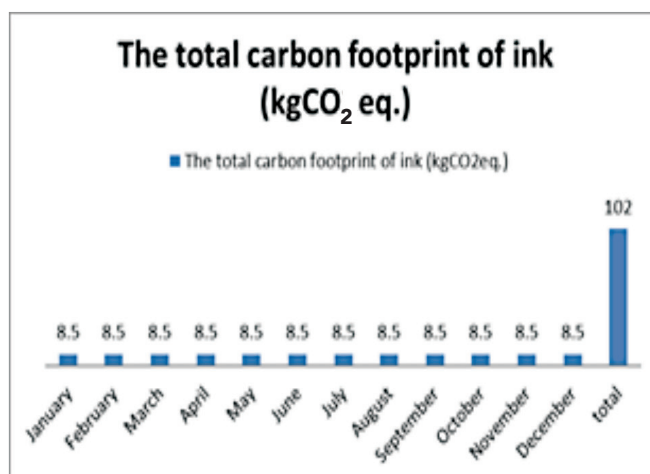


Figure 3 The total carbon footprint of ink (kgCO₂eq.).

2. Department of Transportation

This department has 6 vans and the mean diesel consumption per month was 1,876.1375 L

(Figure 4) for a total CO₂ emission of 6,436.86 KgCO₂/ year.

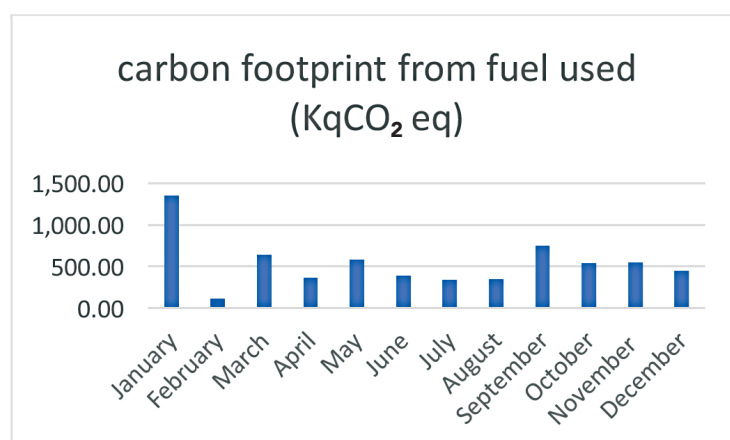


Figure 4 The carbon footprint of Fuel used (KgCO₂ eq).

3. Laboratory

The laboratory data is based on chemicals used and electricity consumed over one year in three where the mean use by laboratory staff is 3 hours/room/day.

Analysis of CF in scope 1

Chemicals in the laboratory emitted 126.68 kilograms (0.126 metric tons) of CO₂ per year. Alcohol antiseptic (95% alcohol) was the highest CO₂ emitter.

Analysis of CF in scope 2

The total, electricity related CO₂ emission was 256,508.71 kg/year and the most common source of this was the air conditioners, which emitted 152,654.14 kg/y (56.12%). The laboratory CO₂ emission data are summarized in Figure 5.

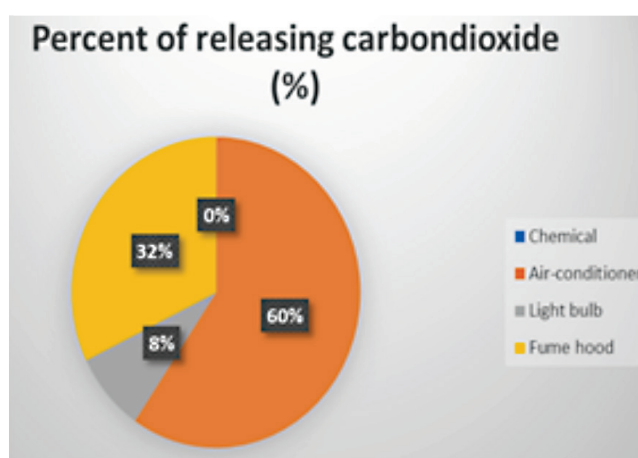


Figure 5 Carbon dioxide emissions from the laboratory.

4. Knowledge before and after learning activity

Pre and post learning mean scores were analyzed for topic of “climate change” and “CF”. For climate change, the pre- and post-test means

scores were 85.2 and 97.8% ($P < 0.05$ for difference), respectively; the corresponding results for CF were 54.8 and 86.6% percent ($P < 0.05$) (Figure 6 & Table 2).

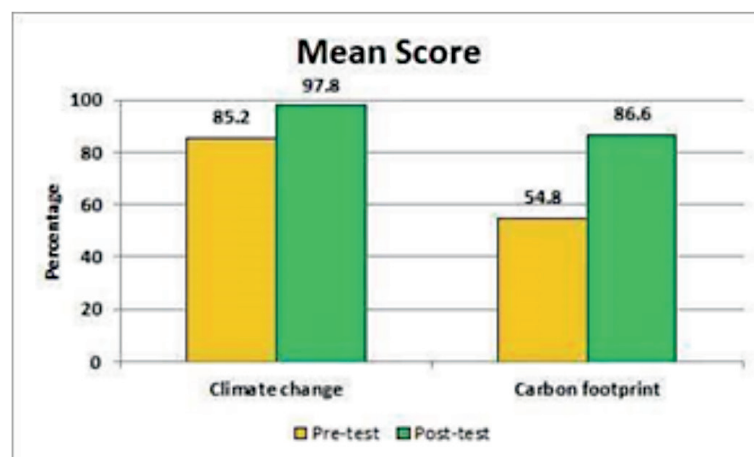


Figure 6 Percent of mean score from pre- and post-test.

Table 2 The result of pre- and post-test mean score by using Mann-Whitney Test

	CFP	CMC
Mann-Whitney U	766.500	1782.000
Wilcoxon W	5422.500	6438.000
Z	-7.762	-4.344
Asymp. Sig. (2-tailed)	.000	.000

Mann-Whitney Test

Group	N	Mean Rank	Sum of Ranks
CFP	1	96	56.48
	2	58	112.28
	Total	154	
CMC	1	96	67.06
	2	58	94.78
	Total	154	

Discussion

We have shown that students are able to learn new knowledge about climate change and CF following a learning program. Indeed, mean scores were substantially higher post training especially for CF. For comparison of the pre- and post-test mean scores from learning activity in “climate change” and “carbon footprint”, the third-year medical students

had higher post-test mean score than pre-test mean score significantly ($P < 0.05$) for both sections.

We have shown that CO₂ emissions are high for individuals and at the institutional level at a large Thai university. Strategies need to be designed to reduce CF and raise awareness of CF starting at high school but continuing to university level.

Acknowledgements

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