

Tobacco Consumption Habits and Road Traffic Accidents: A Study among Heavy Vehicle Drivers in Bangladesh

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Abstract The Road Traffic Accidents (RTAs) is a significant life hazard and threat to life worldwide, which is severe in Bangladesh. Nowadays the RTAs have become an epidemic and there are found growing tobacco consumption habits among the bus-truck drivers in Bangladesh. The study aims to identify the connection between tobacco consumption and heavy vehicle accidents in Dhaka city in Bangladesh. Drivers participated in this cross-sectional study with 424 in-person interviews and 10 key informants' interviews. Differences between different parameters (related to tobacco consumption and driving) were assessed with Chi-squared tests while logistic regression models were used to identify the association of RTA and socio-demographic characteristics. The study result shows 41.7% respondents' driving experience was found as ≤ 10 year's where average (\pm SD) 13.8 (\pm 8.7) years. About 75.9% respondents were tobacco users and among them 94.9% smoke Cigarettes where 77.5% were smoke daily. About 64.6% respondents were involved in RTAs. A statistically significant association was found between RTAs and smoking during driving (OR=2.087, $p=0.003$), having driving licenses of the drivers ($p<0.034$) where with the sickness of the drivers ($p<0.004$). This finding showed drivers are very prone to consume tobacco during driving and no driving license, driving hours, sickness, personal income and education of drivers greatly affects the RTAs.

Keywords: tobacco, consumption, habits, RTAs, drivers, Bangladesh

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1. Introduction

Bangladesh is one of the ten countries that form two-thirds of the world population of smokers involving approximately 43.0% of adults into smoking [1]. Tobacco is Bangladesh's leading cause of death and illness, but the nation's greatest drain on resources. Several surveys in Bangladesh have shown that 27.2% of adults are smokers, as well as 27.2% of the adult population use smokeless tobacco. A vast majority of the population (92.7%) of the country believes that exposure to SHS causes serious illness among non-smokers [2]. It has been discovered that collectively, 93% of the bus drivers smoke, and 20% of their annual revenue goes to tobacco spending. More than half (35.9%) of those drivers stopped smoking after they were drivers; nevertheless, heightened job and environmental pressures had caused certain drivers to start smoking more than they usually. Individuals without an education is at 3 times (probability of) more (OR, 2.8; 95% with 95% confidence interval, 1.2 to 6.13) probable

to be a smoker. The finding found that 53.2% of smokers aged 26 or over violated this criterion, with a p -value of 0.05 [3].

In certain parts of the world, traffic accidents may be considered to be a safety hazard. More people die on the world's roads in Bangladesh from car accidents than from disease, a UN official declared. Every year, over 1.3 million people die in traffic crashes and about 50 million are hurt on the roads. Far more deaths and illnesses arise in countries in low and lower- and moderate-income countries than in the world [4]. According to a survey undertaken by BUET's Accident Research Institute (ARI), road collisions take approximately 12,000 lives each year and result in approximately 35,000 casualties. Additionally, in 2015, 8,642 people were killed and 21,855 others were wounded in road accidents throughout the world. A road accident damages not only human lives but also hampers gross domestic product. Approximately 2 percent of the gross domestic product is lost in road traffic accidents in Bangladesh [5]. This rate has been increased terribly because of road accidents. It's much more concerning to remember that the young adult

demographic, who serves as a nation's economic base, is the most vulnerable to this danger [6].

In Bangladesh, 71% of men in the lower socio-economic community are smokers. People who work hard in a day or in occupations that need a high level of tension are more prone to smoke. Bus drivers who smoke often set aside a portion of their regular earnings for cigars. Occasionally, they manage budgets at the expense of their own or their family's losses. About 50.0 percent of deaths from RTI occur in young adults aged 15 to 44 years [7]. Two targets on road safety were included in the Sustainable Development Goals introduced at the United Nations Summit in 2015 [8,9,10]. These priorities include halving the number of global deaths and injuries from road traffic collisions by 2020 and extending public transportation to provide secure, reliable, effective, and efficient transportation services for all residents by 2030, with particular regard to the needs of those in vulnerable circumstances [8,9,10]. The prevention of traffic accidents is a major public health concern. Tobacco Consumption Habits has been linked to a higher risk of death in traffic accidents [11,12]. Previous research has shown that smokers have a higher probability of injury mortality (i.e., death from an injury), including traffic accident death, than non-smokers; this is attributable to the fact that smoking physically ignites fires, smokers have more underlying illnesses that influence accident rates, and smokers are more likely to be involved in risky conditions. Furthermore, smoking while driving is depicted to increase the risk of car accidents because it distracts the driver and affects their concentration [13,14,15].

To the best of the author's understanding, there is a shortfall in recent research directly focused on the effects of driver tobacco use on heavy vehicle crashes in Bangladesh. As a result, we look past the obvious rigid regulation and law enforcement metrics to consider additional traffic injury considerations such as lifestyle habits, fitness, and physical condition. Therefore, the current study aims to investigate the main effects of driver tobacco intake on heavy vehicle crashes, in order to provide a holistic picture of the relationship between driver tobacco consumption habits and road traffic accidents in Bangladesh. In addition, the analysis sought to identify the driver who is more likely to display the above behavior.

2. Materials and Methods

2.1. Study Design, Area and Period

The cross-sectional study was conducted by using a variety of methods to ascertain the association between tobacco consumption habits and road traffic injuries involving heavy vehicle drivers over 9 months (March to December 2017), in different terminals (Bus Terminal: Mohakhali, Gabtoli, and Jatrabari; Truck Terminals: Tejgaon, Aminbazar, and Doyagonj) of the Dhaka city in Bangladesh.

2.2. Study Population

All the heavy vehicle drivers (bus and truck), leaders and representatives of various associations, i.e. bus-truck

owners' associations, laborer's associations, transport officials and media personalities at the time of the survey and interview were enrolled.

2.3. Sample Size and Sampling Technique

For the quantitative survey, the sample size was determined by using the following formula.

$$n = z^2 pq / d^2$$

Where,

n= desired sample size

z = 1.96 (95% confidence interval)

p = Prevalence of tobacco consumption related to RTI, which assumed unknown and considered as 0.50

q = 1-p

$$d = 5\% = 0.05$$

$$= (1.96)^2 (0.5)(0.5) / (0.05)^2$$

$$= 384 + 10\% \text{ non-response} = 424$$

A total 424 samples were equally selected from different bus-truck terminals (bus drivers 212 and truck drivers 212). A systemic sampling technique was used to reach the target samples and covered as samples (424 respondents) under the total questionnaire survey in face- to-face interviews.

2.4. Data Collection

Two data collection methods (semi-structured questionnaire survey and key informant interviews (KII) were adopted to get a complete picture of the tobacco consumption habits of the heavy vehicle drivers. The 10 KIIs were conducted with bus drivers (2), truck drivers (2), NGO workers (2), media persons (2), and policy activists (2). A total of 424 semi-structured questionnaire surveys were conducted with heavy vehicle bus and truck drivers to get clear understanding about the relationship between tobacco consumption habits and RTAs in Bangladesh. The face-to-face interview technique was used to collect information from the respondents.

2.5. Validation

A total of 20% of interviews were checked by co-listening to the interview in progress, and interviews were terminated if a person appeared to answer at random or announced they were not involved or too exhausted to proceed with the interview. Only questionnaires that were fully filled out were used in the study. Both questionnaires were reviewed until a completely authenticated dataset was passed on to our team to interpret and distribute findings.

2.6. Questionnaire

The questionnaire had 25 questions (both closed-ended and open-ended) and took about 30 minutes per participant to complete. As seen in Table 1, it was divided into four parts.

Table 1. Section of the Questionnaire

Section	Theme	Participants
1	Socio-economic background, previous job status, experience and driving license status of the respondents	Bus and Truck drivers
2	Tobacco consumption status by the drivers	Bus and Truck drivers
3	Road traffic accidents, risk factors for occurring accidents and driving behavior	All participants with a focus on bus and truck drivers
4	Addiction to smoking and road traffic accidents, smoking habits, different behaviors and accidents	All participants

2.7. Statistical Analysis

After completing the data collection, a data entry operator was engaged to perform the data entry and was trained to inform all about the coded answers, multiple response answers, etc. After taking the data file from the data entry team all the data were rechecked to ensure the accuracy of the data entry. Analysis was performed using the calculated weights as the frequency variable. For categorical variables, differences between different parameters (related to tobacco consumption and driving) were assessed with Non-parametric Pearson's Chi-square (χ^2) test. The Spearman correlation coefficient was used to evaluate associations between behavioral variables. Results are focused on differences between parameters (related to tobacco consumption and driving) and demographic characteristics are presented as frequencies or percentages for categorical variables. Logistic regression models were performed looking into association between RTA and socio-demographic characteristics. The initial models included association between RTAs and having driving licenses, sickness of the drivers and driving hours without proper rest breaks as well as all variables deemed statistically significant in the Univariate analyses. Statistical significance was set at $p < 0.05$. Analysis was performed by available latest version of Statistical Package for Social Sciences (SPSS version 25.0; IBM Corp., Armonk, NY: USA) and MS Excel. This is a space

3. Results and Discussion

3.1. Quantitative Findings

It is evident from Table 2 that on average (\pm SD) respondents are 35.6 (\pm 9.7) years of age. Exactly 50% were in 30-40 and above 40 age groups (23.1 percent). The religious affiliation of the respondents reveals that 96.7% respondents are Muslim. It also shows the educational levels of the respondents where 39.2% had education up to primary level, 30% up to School Secondary Certificate (SSC), 8.7% SSC, and above while 17.5% had no formal education. The overwhelming majorities 85.4% were married followed by unmarried 14.2% and widows are 0.5%. Here, 53.1% respondents were from nuclear families and had ≥ 5 family members 55.4%. The average (\pm SD) number of family members per family was found as 4.8 (\pm 1.4). It also demonstrates the respondents' personal and family incomes. Around 55.7%

respondents had BDT 10001-20000 monthly income and the mean (\pm SD) monthly personal income and family income were BD 21,625.0 (\pm 8,744.8) and 26,322.0 (\pm 14462.5), respectively.

Table 2. Socio-economic Background of the Respondents

Variable	N= 424	Percentage
Age group		
<30	114	26.9
30-40	212	50.0
40+	98	23.1
Mean \pm SD	35.6 \pm 9.7	
Religion		
Islam	410	96.7
Hindu	14	3.3
Education level		
No formal education	74	17.5
Up to Primary	166	39.2
Up to SSC	147	34.7
SSC & above	37	8.7
Marital status		
Married	362	85.3
Unmarried	60	14.2
Widower	2	0.5
Family Type		
Nuclear Family	225	53.1
Joint Family	199	46.9
Family Member		
≤ 4	189	44.6
≥ 5	235	55.4
Mean \pm SD	4.8 \pm 1.4	
Personal income (monthly) (BDT)		
$\leq 10,000$	28	6.6
10,001 - 20,000	236	55.7
20,001 - 30,000	127	30.0
30,000+	33	7.8
Mean \pm SD	21,625.0 \pm 8,744.8	
Total family income (monthly) (BDT)		
$\leq 10,000$	26	6.1
10,001 - 20,000	191	45.0
20,001 - 30,000	115	27.1
30,000+	92	21.7
Mean \pm SD	26,322.0 \pm 14,462.5	

Table 3 elucidates the job status of the respondents before joining as drivers. Around 30.4% respondents had no jobs, 26.7% were helpers and the rest of the 15.8% was bus conductors. Here, 41.7% respondents' driving experience was found as ≤ 10 years, followed by 11-20 years 38.5% and 20+ years 19.8%. The average (\pm SD) years of driving history of the respondents were found as 13.8 (\pm 8.7) years. Among the drivers, 93.2% respondents had driving licenses.

Table 3. Respondent's Previous Job Status, Experience and Driving License Status

Variable	Number n = 424	Percentage
Job status before joining as driver		
No Job	129	30.4
In a garbage	41	9.7
As a helper(truck)	113	26.7
As a conductor (Bus)	67	15.8
Business	42	9.9
Farmer	18	4.2
Others	14	3.3
Duration of driving (in year)		
≤10	177	41.7
11-20	163	38.5
20+	84	19.8
Mean ±SD		13.8 ±8.7
Status of driving license		
Yes	395	93.2
No	29	6.8
Duration of receiving license (in year) (395)		
≤5	104	26.3
6-10	91	23.0
11-15	90	22.8
16-20	43	10.9
20+	67	17.0
Mean ±SD		12.2 ±8.4

Table 4. Tobacco Consumption Status by the Drivers

Variable	Number n = 424	Percentage
Tobacco using status		
Yes	322	75.9
No	102	24.1
Type of smoking tobacco (n = 315)		
Cigarettes	299	94.9
Bidis	7	2.2
Hukkah	4	1.3
Others	5	1.6
Frequency of smoking tobacco (n = 302)		
Daily	234	77.5
Less than daily	68	22.5
Initiating age of smoking (in year)		
≤17	93	30.8
18-24	129	42.7
≥25	80	26.5
Mean ±SD		21.4 ±7.0

The tobacco using status of the respondents is depicted in Table 4. About 75.9% respondents reported them as tobacco users, and the rest 24.15 of them found as non-tobacco users. It illustrates that the distribution of the types of tobacco consumptions among the respondents. About 94.9% respondents smoke Cigarettes and only 4%

use Bidies and Hukkah. Among the mentioned smokers, 77.5% were smoke daily and the age of the initiation among tobacco consumption of the respondents also depicted where 42.7% respondents initiate smoking in the age of 18-24 followed by ≤17, 30.8%, and the average (±SD) age of initiating smoking by the respondents was 21.4 (±7.0) years.

Table 5. Road Traffic Accidents

Variable	Number n = 274	Percentage
Occurrence of road accidents during driving life		
Involved	177	64.6
Not involved	97	35.4
Number of accidents in life (n = 274)		
1-2	176	64.2
≥3	98	35.8
Mean ±SD		2.7±2.4
Accident occurring time		
Day	199	72.6
Night	75	27.4

The involvement of the drivers in the occurrence of road accidents in their driving life is illustrated in Table 5. About 64.6% respondents are found to be involved in the occurrence of road traffic accidents in their driving careers. It shows the number of occurrences of road traffic accidents among the drivers. Among the respondents who were involved in accidents in their driving careers, nearly 64.2% made 1-2 RTA (road traffic accidents) in their driving careers and 35.8% were involved with the occurrence of at least 3 or more RTA. The average (±SD) number of RTA occurrences in their driving careers was 2.7 (±2.4). It also displays the scenario of accidents occurring time. About 72.0% of road traffic accidents occur at day times and 27.4% of road traffic accidents occur at night times.

3.1.1. Univariate Analyses

Table 6. Road Traffic Accidents with Driving Hours and Having Driving License

Variable	Ever Involved in road accident		χ ²	P value
	Yes N (%)	No N (%)		
Having driving license				
Yes	250(63.3)	145(36.7)	4.479	.034
No	24(82.8)	5(17.2)		
Sickness during driving				
Yes	250(63.3)	145(36.7)	4.479	.034
No	24(82.8)	5(17.2)		
Driving hours without proper rest breaks				
2-4 hours	83(82.7)	231(62.1)	8.47	0.004
5-6 hours	9 (17.3)	141(37.9)		
Driving hours without proper rest breaks				
2-4 hours	220 (80.3)	127 (84.7)	1.25	0.264
5-6 hours	54 (19.7)	23 (15.3)		

Table 6 is evidence of an association between ever involvement in occurring road traffic accidents and having driving licenses of the drivers. A statistically significant association was found between ever involvement in occurring road traffic accidents and having driving licenses of the drivers ($p < 0.034$). It shows the association of road traffic accidents with the sickness of the drivers and without proper rest breaks of drivers while driving. Statistically significant association was found between the road traffic accidents with the sickness of the drivers ($p < 0.004$) and driving hours without proper rest breaks ($p < 0.264$).

3.1.2. Multivariate Analyses

Logistic Regression Analysis

Table 7. Association of Road Traffic Accident and Socio-Demographic Characteristics

Co-variants	OR	P value
Personal income (monthly) (BDT)		
≤ 10,000	.242	.015*
10,001 - 20,000	.567	.195
20,001 - 30,000	.902	.825
30,000+	Ref	
Education level		
No formal education	.233	.084*
Primary	.286	.135
Primary completed	.313	.159
SSC completed	.327	.174
HSC & above	Ref	
Type of Tobacco using		
Smoking	.749	.447
Smokeless	.219	.010*
Both	Ref	
Smoking during driving	2.087	.003*

Table 7 shows that co-variants are significantly associated with ever involvement in road accidents. Personal income (OR=0.242, $p=0.015$) is strongly associated with road traffic accidents (RTA) and also no formal education (OR=0.233, $p=0.084$) is associated with RTA. Smokeless tobacco consumption (OR=.219, $p=0.010$) is strongly associated with RTA, and smoking during driving (OR=2.087, $p=0.003$) is also strongly associated with RTA.

Table 8. Risk Factors for Occurring Accidents and Driving Behavior

Variables	OR	95% CI for OR	
		Lower	Upper
Age (in years)	0.98	0.94	1.02
Years of education	0.85	0.68	1.07
Having License	2.95*	0.88	9.85
Driving years	0.99	0.94	1.03
Driving time			
Day	1.70	0.70	4.09
Night	2.87*	1.00	8.25
Both	1.16	0.48	2.76
Smoking during driving	2.49*	1.48	4.20

Table 8 demonstrates the risk factors for occurring accidents. The respondents who were smoking during driving and driving at night were over two and half times more likely to cause accidents. Respondents with having license were (OR=2.95, Lower=0.88, Upper=9.85) and carry chance of occurring accidents.

3.2. The Qualitative Findings

As mentioned earlier, qualitative data were collected through the Key Informants' Interviews (KII). In total 10 (ten) key informants were interviewed where the mean age of the participants was found to be as 43.9 years. All of them were males (100 percent), and a little higher than half of the informants had up to SSC level education (5 participants). Four heavy vehicle drivers, two NGO officials, two journalists, and two policy activists participated in the interviews as key informants.

Addiction to smoking and road traffic accidents

Smoking more regularly makes a person addicted and it causes mental abnormality. Most of the study informants said that having cigarettes continuously could cause drivers to become addicted, which could cause severe road traffic accidents, which could cause severe road traffic accidents. A chain smoker is also mentally and physically abnormal, and he becomes reckless, for this reason a driver cannot drive and control the vehicles. Moreover, a cigarette-addicted driver loses his normal sense and then becomes careless. Due to the above-mentioned reasons, driver can't control speed limit and as a result accidents may occur anytime. Another important key informant narrated the situation as follows:

"After smoking, it increases the headache and dizziness; and so drivers become sleepy and their brain cannot work properly. That's why we cannot control the buses. In such a case there may occur big road accidents."

Smoking habits, different behaviors and accidents

Overtaking is accountable for many accidents. Sometimes, overtaking with high speed can cause to severe accidents if the drivers become reckless after having smoking. Therefore, they overtake, and accidents take place. Many of the key informants opined that drivers were often busy with tobacco consumption; as they think, it removes their tiredness and sleepiness. As they become excited while smoking, they try to reach their destinations as fast as possible and drive their vehicles by overtaking. Sometimes, they fail to see a vehicle coming from the opposite direction, and as a result accidents occur. A key informant said,

"Drivers smoke to remove their tiredness to become refreshed. After smoking in the traffic jam, they become more excited. Meantime the jam ends they run their vehicles with higher speed. The drivers with high speed have the tendency to run and reach fast. Sometimes, this can cause severe road crashes."

Drivers take tobacco to get refreshed and to get rid of tiredness. After being refreshed, the drivers feel confident to drive more. So they start to drive recklessly, and try to run faster. So accidents occur. One important respondent argued,

“While driving if a driver smokes or enjoys tobacco, he may not be able to guess the speed and distance of the vehicle coming from the opposite direction. Reckless overtaking can cause a dangerous accident.”

There is a relation between smoking and a driver's vision. Even a driver can lose his senses. These phenomena can make a driver weak with headache, dizziness and so on. The drivers who have these bad habits, their brain does not work fully. Regarding this, some informants stated that the drivers could not notice the vehicle is coming from opposite direction and made accidents due to illusion. One informant shared this issue as mentioned below:

“Maximum road accidents happen by optical illusion; optical illusion can occur due to many reasons. But I think, smoking tobacco or weed is the main reason behind it.”

Those who drive vehicles with tobacco consumption, they do not have control over the brain and seat careless and resort to high speed driving. Then accidents may occur. Some of the informants expressed that accidents could occur due to high speed of the car when the vehicle is beyond control because of smoking/tobacco consumption. Besides, many of the respondents opined that the passengers' aggressive interaction with the smoker drivers while driving causes road accidents. Due to irritating behavior of the passengers to the drivers, they become excited. So they drive abnormally. One key informant said,

“There are many accidents which occur due to some adverse behavior of the passengers with the drivers those who smoke while driving. They lose their control over themselves because of passengers' negative behavior. In the abnormal mental situation due to smoking, cause road accidents.”

4. Discussion

This research gives us a detailed view of the connections between smoking behaviors among heavy vehicle drivers and injuries in Bangladesh. Smoking/SLT usage was found to be statistically associated with substantial in increasing the risk of road injuries. In a study of 4,924 Bangladeshi bus drivers, bus-rucking staff, the incidence of smoking was found to be 75.9% whereas the number of people who had never smoked was 24.1%. It highlights the way in which different cigarette use patterns have emerged over time. About 94.9% respondents smoke Cigarettes and only 4% use Bidies and Hukkah. Among the mentioned smokers, 77.5% were smoke daily and the age of the initiation among tobacco consumption of the respondents also depicted where 42.7% respondents initiate smoking in the age of 18-24 followed by ≤ 17 , 30.8%, and the average (\pm SD) age of initiating smoking by the respondents was 21.4 (± 7.0) years. It is more or less similar to the findings of other studies done earlier. Additional related research has shown that the prevalence of tobacco use among Bangladeshi adult men was 59.0 percent according to our sample as the drivers were adults. However, another study conducted by the same author in 2009 documented a lower male prevalence of smoking (53.6%) [16].

This study explored that about 64.6% respondents are found to be involved in the occurrence of road traffic accidents in their driving careers. Another survey discovered that almost 86 percent of male drivers were involved in road collisions, whereas just 41 percent of female drivers of the same era were [17]. Additionally, it depicts the case of events happening over time. Around 72.0 percent of road traffic collisions occur during the day, while 27.4 percent occur at night. According to a survey conducted in Finland, 26% of young driver deaths occur at night [18]. Additionally, another report revealed that almost 83 percent of injuries involving drivers happened at night [17].

This research establishes a connection between drivers' participation in road traffic incidents and their possession of valid driver's licenses. There was a statistically meaningful correlation regarding drivers' presence in road traffic collisions and their possession of valid driver's licenses ($p < 0.034$). Existing literature shows that about 33% respondents experiencing accidents don't have a driving license and 12% respondents whose driving license was suspended [17]. It shows the association of road traffic accidents with the sickness of the drivers and without proper rest breaks of drivers while driving. Statistically, significant association was found between road traffic accidents with the sickness of the drivers ($p < 0.004$) and driving hours without proper rest breaks ($p < 0.264$). About that matter, a study showed almost 77.9 % of injured drivers' accidents occurred to drivers and passengers [17].

5. Conclusion

This research shows that heavy truck drivers have rampant use of tobacco products. Following an overview of all the analyses and results, the report concludes that the overwhelming majority of heavy-duty bus drivers are unaware that the fatal traffic incidents in Bangladesh include smoking and SLT. The research shows that the total number of years' experience is not over because most drivers have become nicotine consumers and consume cigarettes every day. In the occurrence of automobile collisions, drivers became concerned. It has shown that there has been a statistically important correlation between ever participation in road crashes and driving licenses for the passengers. There was also a significant link regarding road crashes and drivers' sickness. Licensed respondents were more likely to have injuries. Again, drivers should not know about the risk of road traffic collisions related to the use of tobacco. Fostering positive conduct and behaviors is also a monumental concern.

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Statement of Competing Interests

From corresponding and co-authors, we are giving the following declaration:

- We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.
- We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.
- We understand that the Corresponding Author is the sole contact for the Editorial process (including Editorial Manager and direct communications with the office). He is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs. We confirm that we have provided a current, correct email address which is accessible by the Corresponding Author.

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