

## BICYCLE AND HEALTH: A GEO-MEDICAL STUDY OF MADURAI CITY

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**ABSTRACT :** In many countries Motor Vehicle accidents rank first among all fatal accidents. There are almost 3,00,000 deaths from road accidents annually in the world. India has one of the highest road accident rates in the world. Cycle is best suited for maintaining as well as cheapest transport available when compared to other two wheelers. The prevalence rate of accident is low. The present study attempts to analyse the following major objectives. \* To study cycle travel and identify the major dimension with reference to cyclist in Madurai city. \* To analyse the variable structure of major dimensions. \* To analyse the living environment related to health perspectives of cyclist. \* To analyse satisfaction level towards traveling. To conceptualise the facts and suggest measures. The data was based on the primary data collected in all taluks of Madurai city on random sampling basis by interviewing 600 respondents. The data were analysed with the help of multiple correlation known as Factor analysis technique. A deterioration in the ecosystem of life elements such as personal habits, poor socio-economic conditions, over crowding, housing density, illiteracy, traffic system and adoption are responsible factors in the increased prevalence of bicyclers. Alcohol impairs driving ability and increases the risk of accidents. It is the direct cause of 30 to 50% of serious road accidents. In conclusion, cycling is the safest and healthiest means of travel for all sections of people. People should adopt traffic rules and regulation for better driving; young people need to be educated regarding risk factors, traffic rules and safest precautions. The study has thus identified that the environmental parameters played a vital role in the health status of the population in all travellers and cycle traveller in particular.

### INTRODUCTION

The rapid growth in the number of cycle in the last few decades is outstripping the rates of road construction in all the countries of the world. (Babkov, 1975). The combatting of road accidents is not a specific problem for one or only a few countries. The number of accidents is connected with the density of the population and the number of vehicles in a country. (Rothenberg et al, 1974). In many countries motor vehicle accidents rank first among all fatal accidents. There are 300,000 deaths from road accidents annually in the world. India has one of the highest road

accidents rates in the world. One out of every 42 vehicles in the country meets with an accident. (Park & Park 1995). Cycle is the best way of transport and healthier one suited for all types of people particularly in poor socio-Economic group of population. It is an unpolluted vehicle and prevalence rate of accident is also low, Medical Geographers have been increasingly concerned with the application of analytical techniques to observe and analyse the type of disease to find out the association of health elements in relation to causative factors studies of similar type appearing largely in Medical Geographical studies.

The present study in this context attempts to identify and seek an explanation between the causing factors of cycling and health care. Thus by way of identification of major dimensions of bicycles and health in Madurai city.

## METHODOLOGY

The study was based on both primary and secondary sources. The secondary data were collected from district road transport office (DRTO) in Madurai city. The primary data based on a questionnaire survey by direct observation method conducted among 600 cyclists chosen in all the taluks of madurai city. The data were analysed by both intercorrelation techniques and Multivariate statistical technique known as factor analysis. The dimensions extracted from the analysis indicate that the Geo-medical analysis of Bicycle and health in Madurai city are closely related.

## OBJECTIVES

The present study has the following major objectives.

- \* To study cycle travel and identify the major dimensions with reference to cyclist is Madurai city.
- \* To analyse the variable structure of major dimensions.
- \* To analyse the living environment as related to health perspectives of cyclists.
- \* To analyse satisfaction level towards travelling.
- \* To conceptualise the facts and suggest measures.

## TABLE STRUCTURE AND ANALYSIS DESIGN

The 23×23 correlation Matrix of the present analysis has been grouped into 23×7 matrix taking into account only the factors with their eigen values higher than unity. Table 1 explains the eigen values and the percentage variance explained by each factor. The seven factors rotated by the varimax procedure registered more than 80 percent of the total variance. The first factor alone accounts for 22.56 percent of the total variance and qualifies

Table 1

**Factor solution: The eigen values and the total percentage variance explained by each of the seven factors.**

Factor	Name of the Dimension	Eigen Value	Percentage variance	Cumulative Percentage
I	Health and cycling	5.18	22.56	22.56
II	Cycling and Socio Economic condition of Madurai city.	3.64	15.85	38.41
III	Safety transport system	2.98	12.90	51.31
IV	The role of accidents	2.14	9.30	60.61
V	Rules and regulation	1.86	8.10	68.71
VI	Precaution measures	1.69	7.35	76.06
VII	Geographical area related to transport facility.	1.33	5.78	81.84

as the primary factor. This primary dimension is essentially associated with all the disease variables explaining the "Health and cycling". It is also observed that the first seven factors altogether accounted for more than 81 percent of the total variance whereas the first four factors explained only more than 60 percent of total variance. The remaining three factors explained only 21 per cent of the total variance.

### **GEO-MEDICAL STRUCTURE OF HEALTH AND CYCLING IN MADURAI CITY**

#### **Dimension 1: Health and cycling**

The first dimension essentially formed an index to explain the "Health and cycling" in Madurai city. This forms an important factor with cycling as a promoter of health condition on all occasions. This factor dimension contains as many as nine variables accounting for their significant contribution viz pedestrian journey (0.90), Air pollution (0.90), prevalence rate of non. communicable disease (0.88) noise (0.65). It is also the length of travelling (0.48), visual intrusion (0.46) and psychological reaction (0.36) were causes of increasing accident experience. The first above said variables are clearly identify cycling as it influences health.

#### **Dimension II : cycling and socio-economic condition of Madurai city**

The second dimension with an eigen value of 3.64 explained a total variance of 15.85 percent. The high positive factor loading, registered on the variable income below Rs.1500(0.85), proves it to be a significant variable owing to the highest number of cyclists in Madurai city. The negative factor loading registered under variables such as tertiary workers (-0.76), more than 5 members of family (-0.75), visual intrusion (-0.65), psychological reaction (-0.56), mortality rate (-0.50) explain that these are indirectly related to low driving

standards (0.41) an increasing accident experience (0.31). This is clearly justified by a positive factor loading accounted by socio economic conditions related to cyclists.

#### **Dimension III: Safety of transport system**

The third dimension stressed the transport system. This dimension with an eigen value of 2.98 explained the total variance of 12.90 percent and also strongly claimed that types of road (0.86), speed of vehicle (0.85) and literacy rate (0.79) were highly correlated to safty transport system. The correlation observed viz. Accident experience (0.35) Noise (0.35) and tension (0.31) are related causes of unsafe cycling.

#### **Dimension IV: The Role of Accident**

The positive factor loading observed on the variables such as alcohol (0.77), low driving standads (0.77), poorly maintained vehicles (0.36) and annual income below Rs.1500 (0.31) are the cause of increasing Mortality Rate (-0.77).

#### **Dimension V: Rules and Regulations**

A following in the Disregard of Traffic rules (0.92) due to increasing factors such as tension (-0.81) and accident experience (-0.39).

#### **Dimension VI: Precaution Measures**

The high positive factor loadings accounted on variables viz. type of traffic condition (0.88), cyclist aim (0.82), psychological reaction (0.52) Mortality rate (0.38) and literacy (0.36) have revealed the precaution measures of cyclist. This must be possible only when there are enough precaution measures.

#### **Dimension VII: Geographical Area related to transport facility**

The Geographical area related to transport facility formed the seventh dimension explaining a total variance of 5.78 percent.

**Table 2: Dimension 1: Health and Cycling**

Variable Number	Name of the Variables	Factor Loading
3	Function of Physical body of Pedestrian Journeys	0.91
9	Air pollution	0.90
8	Prevalence rate of Non-communicable disease	0.88
12	Noise	0.65
6	Length of travelling	0.48
5	Visual intrusion	0.46
11	Psychological reaction	0.36
15	Accident experience	-0.33
14	Mortality rate	0.32
Eigen Value = 5.18		Percentage of Trace =22.56

**Table 3: Dimension 2 Cycling and Socio Economic Condition of Madurai City**

Variable Number	Name of the Variables	Factor Loading
16	Income below Rs.1500	0.85
7	Tertiary Workers	-0.76
19	More than 5 members of the family	-0.75
5	Visual intrusion	-0.65
11	Psychological reaction	-0.56
14	Mortality rate	-0.50
23	Low driving standards	0.41
15	Accident experience	0.31
Eigen Value = 3.64		Percentage of Trace = 15.85

**Table 4 : Dimension III: Safty transport system**

Variable Number	Name of the Variables	Factor Loading
21	Types of Road	0.86
20	Speed of vehicle	0.85
4	Literacy Rate	0.79
15	Accident experience	0.35
12	Noise	0.35
10	Tension	0.31
Eigen Value = 2.98		Percentage of Trace = 12.90

**Table 5: Dimension IV: The Role of Accident**

Variable Number	Name of the Variables	Factor Loading
1	Alcohol	0.77
23	Low driving standards	0.77
2	Poorly maintained vehicles	0.36
14	Mortality Rate	-0.77
16	Income below Rs. 1500/=	0.31
Eigen Value = 2.14 Percentage of Trace = 9.30		

**Table 6: Dimension V: Rules and Regulation**

Variable Number	Name of the Variables	Factor Loading
17	Disregard of traffic rules	0.92
10	Tension	-0.81
15	Accident experience	-0.39
Eigen Value = 1.86 Percentage of Trace = 8.10		

**Table 7: Dimension VI: Precaution Measures**

Variable Number	Name of the Variables	Factor Loading
22	Typ of traffic condition	0.82
18	Cyclist aim	0.82
11	Psychological reaction	0.52
14	Mortality rate	0.38
4	Literacy	0.36
Eigen Value = 1.69 Percentage of Trace = 7.35		

**Table 8: Dimension VII: Geographical area related to transport facility**

Variable Number	Name of the Variables	Factor Loading
13	Metal Road	0.70
6	Length of travelling	0.55
12	Noise	0.49
14	Mortality rate	-0.32
18	Cyclist aim	0.32
Eigen Value = 0.33 Percentage of Trace = 5.78		

Increase in the mortality rate (-0.32) of cyclists is connected to such possible variables as Metal Road (0.70), length of travelling (0.55) noise (0.49) and cyclist aim (0.32).

### LIVING ENVIRONMENT OF CYCLISTS IN MADURAI

The demographic characteristics of the cycle travellers revealed that male cyclist constituted 81% as against females representing only 19%. The age group between 15 to 34 is dominant both among males and females. Nearly 56.6% of the unmarried (both sex included) were reported to have cycle traveller as against the married singles (35.3%). The majority of the travellers exhibited a poor Socio Economic status (60%). Cycle is best for safety (85%) and easy way of maintaining (78%) as well as cheapest transport available (90%) when compared to other two wheelers. The prevalence rate of accident is low (9%). Alcohol impairs driving ability and increase the risk of accidents. It is the direct cause of 30 to 50% of serious road accidents. Most of respondents have suggested that the physical health condition is also satisfied (85%).

### CONCLUSION

In conclusion of my study cycling is the safest and healthiest means of travel for all sections of people. People should adopt traffic rules and regulation for better driving. The study has thus identified that in Madurai city environment parameters played major role in the health status of cyclist such as Socio-Economic condition, population density, Number of traffic, types of occupation, literacy level, condition of road etc. safety education must begin with school children. The drivers need to be trained in proper maintenance of vehicles and safe driving. It has been aptly said that "if accident is a

disease, education is its vaccine". From the Health point of view cycling is the best precaution method to avoid physical as well as mental illness. Cycling is not only best for health alone but economically also forms the cheapest transportation.

### APPENDIX-I

#### LIST OF VARIABLES

1. Alcohol
2. Poorly maintained vehicles
3. Function of physical body of pedestrian journey
4. Literacy
5. Visual intrusion
6. Length of travelling
7. Tertiary workers
8. Prevalence rate of non communicable disease
9. Air pollution
10. Tension
11. Psychological reaction
12. Noise
13. Metal road
14. Mortality rate
15. Accident experience
16. Annual income below Rs.1500
17. Disregard of traffic rules
18. Cyclist aim
19. More than five members of the family
20. Speed of vehicles
21. Types of road (National Highway)
22. Type of traffic condition
23. Low driving standards.

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