

## **Stress management in highway operations with focus on Passenger Car Drivers**

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**ABSTRACT:** *This paper is a review of literature on the management of stress in Highway operations with particular reference to passenger car drivers. Driving consists of a series of ordered tasks (activities and operations), which demand a lot of alertness from the drivers to assure the desirable safety on the roads. Driving is hierarchal at the levels of control, guidance and navigation which holistically involves (a) automatic management of information between driver and vehicle, (b) management of information between driver, vehicle system and traffic control devices in order to ensure maintenance of safe speed and path of movement and correlating directions from a map with guide signage. An excessive extent in duration, frequency and unstable status of the driver, who is the operator, result into stresses and eventual consequences if not properly managed. Seven (7) factors that can initiate stress in drivers were identified their effects, together with amelioration strategies and techniques were discussed in the paper. The strategies range from design consideration for the transportation facilities, the sub-systems the driver's time and work load management as well as counseling and the five (5) Es of safety in transportation.*

**Keywords:** *Stress, Management, Drivers, Safety, Rest, Physiological stress and Pathological stress*

### **I. INTRODUCTION**

Stress is said to be a great worry resulting from mental or physical distress or difficult circumstances (Cambridge Dictionary, 2005). The Federal Highway Manual (1972) referred to passenger car as a motor vehicle designed for the transportation of not more than 8 persons including the one driver who is the operator. In the course of life, unending struggle for existence and wants continues. In order that these demands are met, several situations and experiences, things and persons are always come by that do arise some level of anxiety and worry (stress). Driving job has a lot of demands that are often difficult to meet; vis-à-vis like attending to passengers, making sure the vehicle is in good condition and clean as well as having to cope with other road users. All the aforementioned activities can lead to stresses.

Thus, driving is a difficult task as it is stressful to the body because it deserves a certain amount of physical and mental fitness and desirable minimum alertness for maximum performance and safety on highway. The operator can not afford any mistake because most often the result of the stress experienced by the driver is either an accident, death, sickness, low performance, time wasting, e.t.c. (Duffy, 1990).

Therefore stress management in highway operation particularly for effective prevention or combating its root and cause is a desirable safety amelioration activity in passenger community in both rural and urban corridors. This paper is aimed at providing concrete advice on how to prevent stress or manage stress while on steering and/or after the day work for all categories of passenger car/vehicle drivers.

Ordinarily stress is assumed as a normal accompaniment of every day living. It helps people to cope and as well serves as a helpful tonic in combating the challenges and struggles of this world. Such type of stress is known as Physiological Stress. However when stress becomes consistent as to limit or impede ones productive capacity and causes disharmony in the synchronous relationship between the mind, the body and the spirit, then Pathological Stress is said to have occurred (Kompier, 1996). Occupational stress on the other hand, is that associated with man's normal callings or experienced in course of duty. The fatigue resulting from this stressor is termed as occupational stress.

Highway operation is said to be activities carried out on the road. These activities if not managed properly could lead to stress, worries or difficult circumstances. Maneuvering for potholes, stopping for policeman, stopping at tollgate, climbing of bombs, vehicle conditions, turning at intersection e.t.c are some highway operations that could lead to stress and if not properly managed and eventually leading to road accidents. Road accidents were found to be more pronounced than with the other modes of transportation. This is because of flexibility of movements and secondly due to mix traffic condition on the road (Gurcharan, 1991). Occupational stress, resulting from highway operations, can no longer be considered an occasional or personal problem to be remedied with palliatives, or as direct effect on the drivers alone, but globally affecting all categories of workers, all workplaces and all countries (Backman, 1983). This trend coupled with its rising cost

to the individual, to industry and to society as a whole, has greatly heightened awareness of the need for effective and innovative ways of tackling stress, hence the need for its management and ultimately prevention.

## **II. MAJOR FACTORS FOR STRESS INITIATION IN DRIVERS**

Certain factors, in an individual driver and environment have been identified (Risser and Aronsson, 1983.) as a major initiator of stress and are generally referred to as stressor. They include the following;

**a. Congestion:** This is a situation where roads and towns become too crowded to the extent of preventing free flow of traffic. This may be as a result of impatience, weather, constraint, accident, and Police check point e.t.c.

**b. Road Condition (Bad Road):** This is a situation where road impede the smooth operation of traffic thereby resulting to time wasting, discomfort to passenger, damage to vehicle (high operational cost), reducing standard of living.

**c. Futile Effort:** This is a fruitless effort put in by drivers which finally result to stress and this type of stress is normally associated with setting unrealistic goals, unaligned action, wrong approaches and procedures, profound negative mental expectation, unwillingness to learn, impatient to accomplish result.

**d. Perpetual Sadness (Physiological and Pathological):** This may be as a result of fruitless mental effort, habitual negative thinking (e.g. "I don't think it is possible", "I may not be able to make it"), tyrannical thoughts (e.g. I must, I ought to, I should have), Pent-Up (Secret) negative emotions (e.g. guilty conscience, fear, shame). Self condemnations (e.g. I am worthless, I am a failure, I can not be helped, I can not do it alone) Unrealistic expectations, Non acceptance of the inevitable, Undue self defense mechanism.

**e. Vehicle Condition:** The State or the condition of the particular type of vehicle in focus. The stress experienced by a luxurious bus driver can not be compared with driver of a smaller car when operating under the same conditions. Those things responsible for stress in vehicles include; Engine conditions, tyre condition, the brake system, type of car, Absorbers conditions e.t.c

**f. Tight Schedule:** One in five drivers said that "tight running times or running late is the most stressful part of the job. In fact, 66% said running times at peak hours are too fast or unachievable. 79% Drivers are often forced to exceed the legal speed limits to meet their schedules. This pressure leads to stress and to accidents. 62% of driver are in hurry hoping to meet up there appointment and when this can not be met, they are disappointed and stress set in as a result of wasted effort, time and money (TSTC Bulletin, 1 999).

**g. Insufficient Sleep:** This is another major cause of fatigue or stress. Humanly speaking the efficiency of any body either a driver or not is reduces with insufficient sleep (N.T.S.B News 1999). Night time driving was found to be one of the major sources of accident as evidence with what is happening in our environment. The article, "How Good Are Our Drivers?" (Phil, 1999) indicates that night driving represents a risk factor, 36 times greater than day driving. Time of day and circadian cycles is identified as the biggest contributors to road accidents at the International Conference in Fremantle, Australia in 1997. Most accidents occur between midnight and 6.00am.

**Effect of Stress on Drivers and Passengers** The effect of stress on the body system is protean and legion. Stress can simulate or be associated with any disease state known to man. The out - come of stress is classified into psychological (Mental) and somatic (Physical) effect as it affects both the brain and the body (Hough, 1990).

### **The Psychological Effect of Stress**

The following are the altitudinal evidences of the effects of stress;

Aggressive Driving

Accident

Apathy and Lack of concentration

Weakness of body

Poor co-ordination of routine task

Low energy level

Irritability, restlessness, and aggressive tendency

Possibility of sleeping on wheel

Voice is usually high pitched and effect is unfriendly and

Easily provoked.

### **The Somatic Effect of Stress (Physical)**

Persistent stresses affect the body unwholesomely because it depletes the body of its immunological reserve and causes various disease states. These effects are stated as it affects the part of the body resulting into different stages of sickness.

**Head and Neck:** Stress is usually associated with heat in the head, which also include the following symptoms:-

- (a) Tension headaches
- (b) Constant neck discomfort
- (c) Blurring of vision
- (d) Premature graying and aging lagging.
- (e) Dizziness and giddiness

**Chest**

- (a) Pulmonary
  - (i) Recurrent catarrh and cough,
  - (ii) Asthmatic episodes,
  - (iii) Tightening of the chest.
  - (iv) Fast and shallow breathing.

- (b) Heart/Blood Vessel

- (i) Increase rate of heart beat.
- (ii) Missed heart beat.
- (iii) Thickening of walls of blood vessels
- (iv) Hypertension (Fore runner of stroke and heart diseases)

**Alimentary System**

- (i) Loss of appetite (with resultant weight loss)
- (ii) There may be increase in appetite (with increase in weight)
- (iii) Recurrent abdominal pain (usually burning in character)
- (iv) Peptic Ulcer disease (Stress ulcer)
- (v) Disorder bowel habit e.g. Diarrhea or constipation.

**Musco-Skeletal**

- (i) Generalized muscle aches and pains
- (ii) Joint pain
- (iii) Crawling sensation all over the body.

**Sexual Disorders**

- (i) Diminished libidinous drive
- (ii) Erectile failure.
- (iii) Impotence.
- (iv) Ejaculatory problem e.g. premature ejaculation, failure to ejaculate
- (v) Dryness of the vagina
- (vi) Painful coital experience
- (vii) Frigidity.
- (viii) Infertility.

**Eventual General Effects**

General effects of stress in relation to highway management and its eventual result are as listed below:

1. Accident
  2. Car burnt
  3. Loss of life and properties
  4. Sickness, e.g. every day malaria.
  5. Weaknesses and Restlessness
  6. Infertility in both men and woman as earlier mentioned
  7. Sudden death.
  8. Frequent urination.
  9. Nervous breakdown.
- To mention just a few

**The Prevention, Control and Management of stress**

Having said all the above which was identified as sources of stress and the effect of stress, it is therefore important that the preventive, control and management way of the stressor be discussed.

### **III. PRIMARY, SECONDARY, AND TERTIARY PREVENTION OF DRIVING STRESS**

Stress prevention programmes is a good antidote for stress, classified into those directed at changing the work environment and those directed at teaching employees stress management or stress reduction skills. As for stress prevention and intervention, another important distinction can be made between primary prevention, on one hand, and secondary and tertiary prevention, on the other. Primary prevention concerns interventions aimed at eliminating, reducing or altering stressors. Secondary prevention concerns approaches designed to prevent workers (in this case, drivers) who already show signs of stress from becoming sick and to increase their coping capacity (Davis, 1987). Tertiary prevention concerns treatment/activities directed at those workers who show strong stress reactions and rehabilitation after sickness absenteeism due to sickness, by combining the two main axes-changing work versus assisting or treating the person and eliminating risks versus preventing it from becoming worse, with this stress is reduce to barest minimum.

### **IV. DRIVERS WORKLOAD MANAGEMENT IN TERM OF MAGNITUDE AND ENVIRONMENT**

Stress prevention can also be looked at from the following:

1. Eliminate or modify the stress -producing situation or remove the individual from it.
2. Adapt work organization and the workstation to fit individual characteristics of the employee.
3. Strengthen the person's resilience to stress, for example, through physical exercise, meditation or relaxation techniques, and social support.

The first two strategies are directed at the Vehicular condition or work situation. The third strategy is personal oriented. Stress management has traditionally focused on individual approaches, usually by counseling individuals or small groups of employees on ways to adapt to, or cope with, various occupational stressors and/or their consequences. More recently, approaches have started to encourage the employee to adjust his or her work environment to abilities of her worker, improving the person-environment fit, and advising management and supervisors to allow or even promote such adjustments. An example of such an approach is the European Union Directive on health and safety (Kompier, 1996). The Directive states that, the employer has a duty to ensure the safety and health of workers in every aspect related to the work in line with the following general principles of prevention: (i) avoiding risks; (ii) evaluating the risks that cannot be avoided; (iii) combating the risks at the source; (iv) adapting the work to the individual, especially as regards the design of workplaces; the choice of work equipment, and the choice of working and production methods, with a view to alleviating monotonous work and (v) work at a predetermined pace and to reducing their effects on health. From the aforementioned, we can systematically deduce that the policies of an organization in a way, can reduce stress and adequate timing is of great importance against work stress. It facilitates the systematic consideration of possible stresses in the work situation and with the worker. A tailor-made programme, referring to the three basic paths, may well be the result of these considerations. A programme to combat work stress will often combine measures from the four quadrants as mentioned above.

#### **Vehicular Consideration of Stress Prevention**

Also as a way of preventing stress, the type of vehicle been used by an individual should be design in such away that it's adjustable to any individual. The most important recommendations concerning the design and construction of cabin components are subsequently listed in later portion of this paper. Consequently, cabin components should become more adapted to individual anthropometric characteristics (Davi and Lowe, 1987) e.g. gender, bodily dimensions and weight. In addition to these recommendations (Anderson, 1992) with respect to the bus cabin, there is a major recommendation which affects the bus as a means of transport and the way, essential safety standards are met. In particular, this basic recommendation is directed at bus companies in developing countries. Urban transport in some -developing countries/cities usually consists of old and over crowded buses e.g. Lagos, Ibadan and Kaduna. In many cases, these buses do not meet technical safety standards (e.g. regarding the body, brake system, mirrors, etc.) which could also lead to stress (Davi and Lowe, 1987). Especially in the case of older buses, periodical technical maintenance, and the proper and timely repair and replacement of old parts in the technical system, is extremely important.

#### **Some Design Recommendations for Vehicles. (Davi and Lowe, 1987)**

##### **Driver's Seat**

Ensure that both big and small drivers can adopt comfortable driving postures.  
The range of adjustments of many seats needs to be enlarged. The vertical range should be 100 mm; the range before and after should be more than 150mm.  
Adjustable springs.  
There should be lumbar support which can be adjusted in height and thickness.  
Provide easy-to-operate controls for adjustability.

### **Steering Wheel**

The diameter should be less than 500 mm.

The steering wheel should be adjustable along the axis of the steering column.

The steering wheel should have an independent adjustment of its angle of inclination (15-3.2 degrees to the vertical).

### **Pedals**

Pedals should be within easy reach, even for small drivers.

The pedals should have equal angles.

The range of the angles should be less than 25 degrees.

### **Dashboard**

Ensure that all displays can be seen easily from the point of vision.

Arrange displays according to functions and frequency of use.

Provide easy-to-read labels for each display.

Ensure easy and safe operation of manual controls, in particular emergency controls.

### **Working Space and Environment**

Ensure that both big and small drivers can safely enter and leave the workplace.

Provide more effective heating and cooling systems.

### **Training**

Provide adequate training for new drivers.

Ensure retraining if new bus models are introduced.

### **Stress Management**

The management of stress is tripod

(a). Physical management

(b). Psychological (Mental) management

(c). Spiritual management

Each of these categories was further discussed in subsequent sections:-

### **Physical Management**

These are those preventive measures taken in order to only physical abuse. They include

### **Rest and Recreation**

We should learn to rest and find time to do so to avoid stress. Permit me to refer you to the book of Genesis Chapter 2, Verse 1 and 2, and 1 quote "Thus the heaven and the Earth were finished and all host of them. And on the seventh day God ended his work, which He had made and He rested on the seventh from all His work, which he had created and made". From this we can see that the creator of heaven and earth. Clod Omnipotent and Omnipresent has given us an immutable and invaluable example Rest. If God himself rested, who is mortal man to cheat nature?

### **Sleep**

Adequate sleep is a good antidote to stress. During sleep, one is replenished with power and vitality. When one is asleep one is completely in the hand of nature, it is an opportunity for her to build up worn-out tissues, by strengthening the nerves into correct running order. Education about the physiological need for sleep and its deprivation effects, the need to educate drivers on the amount of sleep required by the human body and the danger of not getting sufficient rest should be made known to each category of drivers. Some training materials should be provided that addresses the need for enough rest or sleep. The medical physiology text book by Guyton and Hall (2000) provides sleep states and it points out the need for public education on these facts that at least for any adult male 6 hours of sleep is needed in a day and for female within 6-8 hours of sleep is needed for an effective wakefulness.

### **Bathing**

Next to sleep is frequent bathing of the body. It's important in relieving stress and ensuring physical well being. Bathing has aesthetic as well as therapeutic influence on human kind. Remember the adage "Cleanliness is next to godliness" the body is indicative of pure, stress free spirit.

### **Diet**

The golden rule is "Eat to live" not "Live to eat" in the strongest and happiest way, in the way most beneficial to ones and to the society at large (Guyton and Mall; 2000).

### **Exercise**

Graded, moderate, tolerable and regular exercises are a must to ward off stress. A walk, simple breathing exercises, simple out door games, jogging or even military drill and gymnastics are prerequisites for ensuring a stress-free world. So let exercise regularly.

### **Adequate Time Management**

Pre-plan all your day schedule and try to work according to that your plan.

### **The Psychological (Mental) Management:**

This said to be proper and adequate of the brain towards a positive achievement. It involves the following activities.

#### **Generate Positive Emotions and Imaginations**

Have positive reflections and recall past ecstatic moments, achievements and opportunities. Set new goals and apply new techniques. Have moment of retreat, observed silent hours. Don't ruminate all the time. Back up your ideals with actions instead of just thinking.

#### **Learn Winning System**

Seek knowledge from people around you. Look for investment opportunities. Learn about budgeting of money to avoid frustration, read widely, listen to people and observe your environment with keen interest.

#### **Power of Auto-Suggestion**

The law is "I am what my thinking makes me", "they conquer, those who believed they can" therefore acquire a positive self-image. Be confident, believe in what you do and do what you believe in. Have self-mastery, a self-controlled mind is free and freedom is power.

#### **Develop Right Attitude**

Our attitude, not aptitude, is the master key that unlocks several doors and creates more opportunities for us. For it is written that "the man who humbles himself shall be exalted" Love people and you will be loved, for the measure you give is the measure you received" and is also said that your attitude determined your altitude.

#### **Team Work**

To avoid executive stress, delegate duties and authorities to sub-ordinates. Develop spirit of teamwork in your home, place of work or worship. We are made for cooperation and companionship. Nature abounds with evidence of co-operation; take a cue from the Honeybee. Each hive contains workers, a queen and drones. Each of these has assigned duties, which are executed with never failing precision. Not to co-operate, therefore is contrary to the law of nature and it breeds stress.

#### **Be a Good and Big Dreamer (Mental Imaginations).**

Civilization owes most of mankind progress to dreamers we are as big or as small as our dreams; however, anchor your dreams down to earth fulfillment. Give your dream practical application.

#### **Super Sensitivity**

A sensitive person feels that the world is looking at him all the time watching every moment. This give rise to stress: this can be antidotes by thinking more of others and less of you. Mix-more freely with people and develop interest in other things other than self. E.g. joining non-governmental organization or philanthropic societies learns to recognize good in others. In that way stress would have been erased out of your system.

#### **Be a Possibilitarian**

With God, all things are possible. Don't look at the obstacles on the way of life as insurmountable. Obstacles may be large or small depending on weather the person they confront is large or small. Most obstacles will disappear once we make up our mind to plow through them. Remember "When the going get tough, the tough get going". "Tough time never last, only tough people do".

### **Learn to Trust People**

Trusting people demand wisdom, however be wise as the serpent but harmless as dove" Do not build up resentment or bottle up hatred against any one. Let steam off by confiding in people as problem discuss is problem half solved. Decongest the load in your psychological ware house by venting every anger and frustration, appropriately and timely. Tell people your difficulties; they may be of help.\

## **V. SPIRITUAL MANAGEMENT**

This by letting God takes control of your activities while believing that with Him all things are possible (but your level of faith matters a lot). Permit me, to once again quote from the Holy Bible. The Holy Bible says "Only a fool says there is no God" God is the author of the vast and mysterious universe. He is able at all times seek him always in prayers and supplications. For God says "Cast your burden (stress) upon me and I will give you rest; and I will give you "peace". Follow God's golden rule "Love God with all your heart, and with all your might, and with all your strength". "Do unto others what you would want them to do unto you". In that way you will enjoy a stress free life. Learn to forgive others. Carry out corporal and spiritual works of mercy in your communities. Opportunities to do so abound everywhere. The book of Micah, chapter 6, verses 8 says, "What does God require from you" Simply this Act justly. Love tenderly and Walk humbly with your God. This is the greatest antidote of stress.

## **VI. CONCLUSION**

Stress has been identified to be a major problem in the operation of highway with regards to all the sub component of this mode of travel. The driver, a key element in the system (the operator) is very easily liable to stress in the course of carrying out his routine responsibility. Various factors that can initiate stress in the driver include congestion on the road, concentration on the road, state of the mind and physique of the driver as well as the condition and design of the vehicle. Of course it included the workload (time schedule) of the driver. The ultimate and total effect could be devastating.

An indication that stress is conquered is a healthy, robust, jolly good fellow at all times. Izaak Walton (1990), the great English author said "Look at your health and if you find it and are free of stress, praise God, and value it next to a good conscience. Good health is a blessing from God, which money can not buy. "Health" they say is "wealth". The German-American Philosopher, Luther Burbank (1998) Said and I quote. "If you violate nature's laws, you are your own prosecuting attorney, judge, jury and hangman". Nature say to avoid stress you must eat sanely, sleep soundly, care for your body, avoid anger and hatred, be industrious, sober sell respecting and praise God at all times if you flaunt her laws, you will have just naturally walked into the jail of accident, deformation, death, indigestion, nervousness, frustration, ill-health, a bad heart, worthlessness and failure. There is no appealing in the case and there is no excuse.

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