DISSERTATION IN PARTIAL FULFILLMENT

OF

MASTER OF MEDICINE IN

OBSTETRICS AND GYNAECOLOGY

UNIVERSITY OF NAIROBI.

2009.

SUBMITTED BY

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EVALUATION

OF ERECTILE DYSFUNCTION

AMONG BICYCLE TAXI RIDERS

(BODA BODA)

IN BUNGOMA TOWN .

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ABBREVIATION AND SYNONYMS

ED.	Erectile Dysfunction
BCE.	Before Christ
MMAS.	Massachusetts Male Aging Study
NHTSA.	National Highway Traffics Safety Administration
BODA BODA	bicycle taxi operators
KNH	Kenyatta National Hospital
MTRH	Moi Teaching and Referral Hospital
IIEF-15	15-item version of International Index of Erectile Dysfunction
QEQ	Quality of erection questionnaire
EHS	Erection hardness score
EF	Erectile function

DEDICATION

This book is dedicated to my wife Evelyn, my children, Natasha and Nigel whose love and support has made my work enjoyable.

To my mother, Janet through whose skills as a midwife, I got inspiration to become an obstetrician.

ACKNOWLEDGEMENTS.

I am grateful to the ministry of health for having granted me the scholarship to train in obstetrics and gynecology at the university of Nairobi with the aim of improving the health care of women in our community. I would also give thanks to Moi teaching and referral hospital, Eldoret, Bungoma district hospital, Bungoma and the Chwele community, Bungoma district, for enabling me do my elective term in their institutions. The experience contributed immensely to my knowledge.

Special thanks to my supervisors, Dr Eunice Cheserem and Dr Frank Kagema for their support and guidance. It is through your dedication that I have come this far.

All members of staff of the department of Obstetrics and gynecology university of Nairobi including the Chairman prof. Koigi Kamau, all the consultants for their words of wisdom enriched with experience, I am particularly obliged to say thank you, To Dr M. Machoki, your special input was of much help.

I wish to appreciate the administration of Kenyatta national hospital for allowing me to learn and practice my skills in their institution. I also thank my research assistants, Gertrude and Alice of Bungoma district hospital and their eight assistants for their good job. Special thanks to Dr. Mukoko for the data analysis.

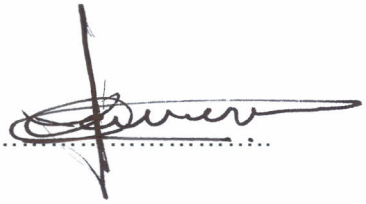
To all friends and colleagues especially the fellow residents for their cooperation, being their chief Resident; quite a challenging task to combine administration and academics.

Last but not least, I do thank my wife Evelyn and children, Natasha and Nigel, for their love and support during this program.

To the Almighty God I give thanks and praise.

DECLARATION.

This is to certify that the dissertation herein is my original work and no other similar study has been done in the same institution.

SIGNATURE: 

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ABSTRACT

BACKGROUND; Organic erectile dysfunction is common in elderly men but is not prevalent in men below 40 years of age. However, in addition to other known causes such as smoking, alcohol intake and diabetes mellitus, recent research has implicated bicycle riding as the cause of erectile dysfunction(ED) in much younger men. Even stationary bikes can cause trauma to the blood supply to the penis, resulting in ED.

STUDY DESIGN. Cross-sectional comparative study, comparing erectile dysfunction among boda boda taxi riders and sugarcane cutters in Bungoma town and Nzoia sugar company.

MAIN OBJECTIVE; To evaluate the effects of long term bicycle riding on erectile function among bicycle taxi (boda boda) riders in Bungoma town.

MAIN OUTCOME MEASURE. Prevalence of erectile dysfunction among bicycle taxi riders and sugarcane cutters, compare rates of erectile dysfunction between bicycle taxi riders and sugarcane cutters.

RESULTS. A total of 230 participants were enrolled in this study of whom 115 were sugarcane cutters and 115 were bicycle taxi riders. The overall prevalence of ED among bicycle taxi riders was 35.9% and 34.0% among sugarcane cutters, was not significantly different. The period of riding in months was not significantly associated with ED among bicycle taxi riders but the length of riding in hours per week was significantly associated with ED $p< 0.01$. The risk of ED increased as the hours of riding per week increased. None of those who rode for more than 60 hours per week had a normal erectile function. The type of bicycle used was significantly associated with the quality of erection $p<0.05$, hardness of erection score $p<0.05$. Those who used mechanical (none motorized) bicycles had an increased risk for ED.

CONCLUSION. Longer hours of bicycle riding per week and use of non-motorized bicycles was associated with higher rates of erectile dysfunction among Boda boda taxi riders.

RECOMMENDATIONS.

Those involved in this business should be advised to work for fewer hours per week and rest more to decrease the risk of erectile dysfunction.

INTRODUCTION

Erectile dysfunction(ED) is a common condition that has affected men for centuries. Although ED was considered a benign complaint, we now recognize that ED and sexual health have a profound impact on the overall health and quality of life of affected men and their spouses/partners (4).

Epidemiological studies show that the risk of ED increases with advancing age and that the typical patient with ED is generally in his 50s or 60s, there is increasing evidence, however that ED also occurs in much younger men(5). ED may be caused by psychological factors or hormonal problems as well as chronic disease or acute injury (14). Recently, there has been growing interest in the role of bicycling in the development of ED particularly in young otherwise healthy men who lack the typical risk factors such as hypertension, elevated lipids, and cigarette smoking. Even stationery bikes can cause trauma to the blood supply to the penis, resulting in ED (10, 22)

LITERATURE REVIEW

Physiological response to sexual stimulation is thought to occur in stages that are variable and very individual. Although men will progress through the stages in order, the amount of time spent in each stage can vary dramatically (1).

1. **FUNCTION;**

Stage one –Excitement

- Vasocongestion or the accumulation of blood in pelvic area during early arousal contributes to erection of the penis. The degree of erection during this phase depends on the intensity of sexual stimuli (1).
- The inner diameter of the urethra doubles. The scrotum pulls towards the body (1).
- Muscular tension increases in the body. Heart rate and blood pressure both increase (1).

Stage two-plateau phase

- The penis does not change markedly during the second phase of response, although it is less likely for a man to lose his erection if distracted during plateau phase than during excitement (1).

- The testes increase in size by 50% or more and become elevated towards the body(1)
- Muscular tension heightens considerably and involuntary body movements such as contractions in the in legs, arms, stomach and back may increase as orgasm approaches. Heart rate increases to between 100-175 beats per minute (1).

Stage three- orgasm

- Actual climax and ejaculation are preceded by a distinct inner sensation that orgasm is imminent. This called ejaculatory inevitability. Almost immediately after that feeling is reached, male senses that ejaculation cannot be stopped (1).
- The most noticeable change in the penis during orgasm is the ejaculation of semen, although orgasm and ejaculation are two separate functions and may not occur at exactly same time. The muscles at the base of penis and around the anus contract rhythmically (1).
- Males often have strong involuntary muscle contractions throughout the body during orgasm and can exhibit involuntary pelvic thrusting. The hands and feet show spastic contractions and the entire body may arch backward or contract in clutching manner (1).

Stage four- resolution

- Immediately following ejaculation, the male body begins to return to its unexcited state. About 50% of the penile erection is lost right away, and the remainder of the erection is lost over longer period of time (1).
- Muscular tension usually is fully dissipated within five minutes after orgasm, and male feels relaxed and drowsy (1).
- Resolution is a gradual process that may take as long as 2 hours (1).

Refractory period

- During resolution, most males experience a period of time in which they cannot be restimulated to ejaculation (1).
- On average men in their late thirties cannot be re-stimulated for 30 minutes or more (1).

- Very few men beyond their teenage years are capable of more than one orgasm during sexual encounters (1).
- Most men feel sexually satiated with one orgasm (1).

DYSFUNCTION

Sexual dysfunction may have physiological or psychological causes or a combination of both. Between 10-52% of men at some point in their lives will experience some type of sexual dysfunction[2]. One recent study in the journal of American medical association (1999) found sexual dysfunction common in 31% of men aged between 18 to 59 (7).

Sexual intercourse is essential for both the physical and mental well being of an individual and marital stability (2).

In addition to being economical and efficient forms of transportation, bicycling has become a popular activity for relaxation, exercise and weight loss. The aerobics exercise required for biking has strong cardiovascular benefits and has also been shown to reduce the risk of diabetes and hypertension (6).

As for the Scythians however, who identified horseback riding as a possible cause of male impotence in the ninth century BCE. The relationship between bicycle riding and ED has become a matter of concern. Numerous case reports have been published of bicyclists with erectile difficulties and/or perennial nerve dysfunction that resolves with changes in cycling techniques, rest or use of a softer saddle(3). Small observational studies have also shown relatively high prevalence of ED among elite cyclists who often reported penile numbness, and changes in sensation after cycling (20).

The effects have been confirmed in the pathophysiologic studies that describe compression related changes in perineal structure as well as in studies of stationary bicycling, which show a significant decrease in penile blood flow during seated biking and a return to above normal when the rider stands(10).

Although this research all points to a relationship between ED and bicycling, this association has been demonstrated only recently in a population based random sample of men. Researchers evaluated data from the landmark Massachusetts Male Aging Study (MMAS) a large cross-sectional survey of 1709 free living men in their 40s to 70s. The random sample was

representative of a similar population of men and includes a variety of cyclists, such as recreational and occasional riders, stationary bikers and serious sports cyclists (8).

A key finding of the MMAS was the relationship between moderate cycling (<3hours per week) and development of Ed. The 3 hour period was selected because it reflects a typical amount of exposure for stationary riders going to gym as well as for commuters who ride about 15 minutes each way to work every day. Analysis of the data showed that individuals who cycle at least 3 hours per week have an odds ratio for developing moderate or complete ED of 1.72 (odds ratios >1.5 are defined as health risk). That is, at least 3 hours of cycling per week was most likely to cause artery blockage and long term damage (8).

More significant, however, was the finding that men who bicycle less than 3 hours per week or who ride only occasionally have an odds ratio of 0.61 for developing moderate or complete ED. This indicates that moderate exercise in the form of bicycling can, in fact prevent ED (6).

Studies have shown that sedentary lifestyle increases risk of heart disease and the probability of developing ED. In the MMAS, men who remained physically inactive had the highest risk for ED, whereas those who began exercising or who continued to exercise throughout the study had the lowest levels of ED. This new MMAS analysis further confirms the value of exercise, particularly bicycling, moderate cyclists were found to be less likely to have moderate or complete ED. There was also some suggestion that substituting bicycling for another activity may even protect against ED (5).

That cycling can cause impotence in men is almost certain, at least based on studies in America and Europe. This is thought to be caused by compression of perineal arteries and nerves. To study how such pressure might compromise sexual performance, Dr Goldstein set out to measure the degree of compression in the carvenosal artery that feeds the penis. He used three different methods (x-ray, ultra-sound and arterial pressure readings) to gauge the effects of sitting on a narrow unpadded saddle, or wide padded saddle and a chair (22).

From a test of 100 impotent patients' studies over 10 months, he determined that it takes only 11% of a person's body weight to compress the artery. He measured a 66% average reduction in blood flow through the artery when subjects were on the skiing saddle, 25% when on the wide saddle and no change when seated on the chair. Hence the wider the surface of a seat ,the less the chance of compression(10).

Long term compression may cause impotency, since this potential cause of impotency does not stem from one traumatic impact and in some cases remain symptom less for years. It is worrisome for cyclists who put in many miles. It may be akin to the gradual build up of cholesterol in blood vessels only instead of fatty lipids, accumulating on artery wall, scar tissue is forming from all the rubbing and compression. Over time this may narrow the artery enough to reduce blood flow and cause erection difficulty (10).

An associate professor of urology at the University of Southern California and the director of a male clinic in Santa Monica, California, Dr, Harin Padma Nathan says he treats 50-100 cases of what he terms bicycle related impotency annually (12).

Typically the patient is a roadie who has logged many miles on an unpadded saddle that was set fairly high, or a mountain biker who has been riding off road trails aggressively. Both types are also usually quite lean, meaning they have less cushioning in their nether regions. Penile numbness and excessive genital shrinkage are warning signs that there may be too much pressure on your crotch. The nerves in the perineum are being pinched which means the artery that feeds the penis is also being compressed (12).

In 1999, research conducted on 15 willing male cyclists established that a number of them suffered erectile dysfunction after a long standing history of bike riding. During the same year, German researchers found evidence linking impotence to cycling. They surveyed 1114 armature cyclists in local clubs who pedaled 100-400kms per week and compared the results to those from 155 active long-distance swimmers (3).

The rate of impotence in the cyclists was 4% compared to 2% for swimmers. They also found that more than half of the cyclists complained of numbness in the genitals. In 2004 similar studies in the U.S and Italy confirmed the same findings. The U.S research established that 5% of men who ride bikes intensively developed severe to moderate erectile dysfunction. But some experts believe that the number may be much higher because many men are too embarrassed to talk about it or fail to associate cycling with their problems in the bedroom.

Researchers in Austria have found that many mountain bikers experience saddle related trauma that leads to small calcified masses inside the scrotum. A dozen or so studies from peer review journals were summarized in three in September 2005 journal of sexual medicine by" (**1**) dr. Steven Schrader, found an increase in interest(and concern) by (**2**) Huang et al, only the nose knows: penile hemodynamic study of perineum-saddle interface in men with erectile

dysfunction utilizing bicycle saddle and seats with and without nose extensions by (**3**) Munarriz et al and development of a new geometric bicycle saddle for the maintenance of genital-perineal vascular perfusion" by Breda et al. this three peer reviewed articles research the pathophysiology of erectile dysfunction associated with bicycling(23).

They together reported that the high pressure in the perineum while straddling a saddle compress and temporarily occlude penile blood flow. They also hypothesized that the lining vessels of the compressed arteries become damaged, thus leading to potential permanent artery blockage (25)

However, not all men who ride bicycles will develop erectile dysfunction. One past study suggested that a sexual health consequence adversely affects 5% of riders. Dr. Schrader's groundbreaking research in 2002 reported on the hazards of bicycle riding in police officers. He concluded that night time erections were of poor quality in biking police officers compared to non-biking police officers. Furthermore night time erection quality decreased as seat pressure increased and as the average number of hours in the saddle a day increased.
( )

To better appreciate the scope of the problem, a 2002 national survey of pedestrian and bicyclist's attitudes and behaviors was sponsored by the U.S department of transportation, highway traffics safety administration (NHTSA) and bureau of transport statistics, in part to gauge bicycle use. According to the survey, approximately 57 million people, 27.3% of the population aged 16 or older, rode a bicycle at least once during summer of 2002(26). In May Dr. Irwin Goldstein et al, in his study on the effects of saddle pressure and compression on the penile artery, found through case series of his patients given below;

1. Case 1. A 54 year-old attorney who never had any problems with sexual performance, suddenly became impotent after cycling almost 200 miles during a 2-day charity ride last summer. Pedaling a new road bike equipped with a racing saddle and an aero-bar, he noticed that his penis was numb during most of the event. After experiencing erection difficulties for the next 6 months, he finally visited an urologist, who, using angiography, identified arterial damage at the base of the shaft of the penis (22).

2. Case 2. A 33-year-old computer programmer experienced pain that went beyond usual aches after a long mountain-bike ride on rough terrain. The pain epicenter was near his penis, which would not get as hard or as erect as it used to. When he eventually

consulted an urologist, and after a thorough history and physical exam were conducted followed by diagnostic testing, he learned that his penile artery had become obstructed (10).

3. Case 3. A 55-year-old man, who never had a bicycle accident or any sexual dysfunction, started riding a stationary bicycle after a heart attack. Seven years later, after pedaling nearly 50000 miles, his heart was indeed strong, but his penis had gone soft. Special studies uncovered no abnormalities in the penis itself, but right where it attaches to the pubic bone (exactly where the bicycle seat fits), an urologist found arterial luminal obstruction that was impairing blood flow to the patients penis (23).

More recently, an epidemiologic association between bicycle riding and ED was established by comparing questionnaire data from more than 1,000 men in a bicycle riding club, 4.21% of whom experienced ED compared with 1.12% of the control population of male runners who experienced ED with no exposure to bicycle riding. It was also noted that bicycle-riding exposure (hours per week, miles per week, lifetime hours, or lifetime miles) was directly correlated with the number of urologic complaints, including ED and perineal numbness (26).

STUDY JUSTIFICATION

A study on erectile dysfunction among male bicycle taxi operators has not been done in our local set up, despite increased allegations in the regions heavily involved in this mode of transport, that there is significant decrease in potency among men after long term boda boda riding. There is thus need to unravel this believe as we strive to promote this small enterprises as a means of employment among the youth but ensure it has no detrimental effect on their reproductive life and hence marital stability.In order to exclude strenuous physical work as the main cause of ED sugarcane cutters will be used as comparison group.

The compression of the perineum by bicycle saddle causes transient numbness to the penis lasting anywhere from hours to days in most cases, usually affecting riders who often go long distances. Through unprotected cycling more young men are prone to impotence because, the youths are stronger, but get frustrated after getting caught up in the web of elusive search for employment. The pressure on this crucial part of the body is greater and more disastrous if the cyclist is hauling a load.

.STUDY QUESTION:

Does long-term bicycle riding influence erectile dysfunction among bicycle taxi riders?

BROAD OBJECTIVE

To determine the effect of long term bicycle riding on erectile function among bicycle taxi riders in Bungoma town.

SPECIFIC OBJECTIVES

1. To determine the socio-demographic profile of bicycle taxi operators and sugarcane cutters in Bungoma town.

2. To determine the prevalence of erectile dysfunction among bicycle taxi riders in Bungoma town in the six months preceding the study.

3. To compare the rates of erectile dysfunction between bicycle taxi operators and sugarcane cutters in the six months preceding the study.

4. To make necessary recommendations for appropriate interventions where applicable.

METHODOLOGY

STUDY SITE

Bungoma district is part of western province of Kenya, bordering Uganda to the west. Boda boda (bicycle taxi) riding is thought to have started at chebukube border point in Bungoma district during the coffee boom of early 1970s as a means of smackling coffee into Kenya. Now this mode of transport has become a major business in Bungoma town. It is approximated that there are *1300 bodaboda taxi riders* in Bungoma town. Nzoia Sugar Company is also located in Bungoma district. It derives its manual laborers (sugarcane cutters) from within the district (on outskirts of Bungoma town). The study targeted bicycle taxi riders in 5 stations within the municipality (Kanduyi,Ntengelwa, Musikoma, Bus stage, Mandisini). The sugarcane cutters were interviewed at 5 stations (Bukembe, Sirare, mabanga, Nuclear, Bulondo).

STUDY DESIGN

Cross-sectional Comparative study; A Cross – sectional survey determining the prevalence of erectile dysfunction among bicycle taxi riders in Bungoma and cane cutters as a comparison group.

STUDY POPULATION

Bicycle taxi riders and sugarcane cutters aged below 40 years and married. The participants were from low and lower middle socioeconomic status and were able to understand Luhya,Kiswahili and or English languages. Of the 230 participants, 115 were bicycle taxi riders and 115 were sugarcane cutters, all met following criteria;

INCLUSION CRITERIA

- All male boda boda taxi operators and sugarcane cutters aged 40 years and below.
- Have been riding boda boda taxi bicycles for at least six months.
- Have been cutting sugarcane for at least six months.
- Married and stays with spouse.

EXCLUSION CRITERIA

- Single men and men over 40 years old.
- Does both bicycle taxi business and also cuts sugarcane
- Those who do not consent to the study.

SAMPLE SIZE

The sample size per group is

$$n' = \frac{\left\{ z_{\alpha/2}\sqrt{2\bar{p}\bar{q}} - z_{\beta}\sqrt{p_1 q_1 - p_2 q_2} \right\}^2}{d^2}$$

$$n = n'/4\left(1 + \sqrt{1 + 4/n'|d|}\right)^2 \text{ "continuity correction".}$$

$$\bar{p} = (p_1 - p_2)/2 \text{ and } \bar{q} = 1 - \bar{p}$$

P_1 is the probability of erectile dysfunction in bicycle taxi riders and p_2 is the probability of erectile dysfunction in sugarcane cutters.

Confidence interval = 95% (1.96)

Power = 80% (1.64)

d = $\bar{p}$ -$\bar{q}$

Assumption; By substituting average incidence of ED of 50% in bicyclists and incidence of 31% in general population (J Prins etal – prevalence of erectile dysfunction: A systematic review of population based studies – int. J.Impot.Res.(2002),14,422-432).

P_1 = 50% p_2 = 31% n_1 = 115 n_2 = 115

Total = 230.

Reference Fleiss JI statistical methods for Rates and Proportions (2nd edition). Wiley: New York, 1981.

SAMPLING METHOD

Simple systematic random sampling was used. Alternate taxi riders and sugarcane cutters were sampled in each of the town bases and given numbers to avoid repetition. Participants were selected and those who met eligibility criteria, there identity card numbers were recorded to avoid repetition. Participants were marched for age and duration of work. Using the prevalence ratio in sample size, it was expected that 1 in 3 of the sugarcane cutters and 1 in 2 of the bicycle taxi riders has experienced ED in there lifetime during their work. Therefore in getting a sample of 228, at least 95 of them had had ED.

Procedure : on day one 4 research assistants were stationed at Kanduyi for bicycle taxi riders and another 4 at Bukembe for sugarcane cutters and performed the following;

- Got participant's identity card number and recorded to ensure he is not recruited twice in other stations
- Confirmed that he is a bicycle taxi rider or sugarcane cutter
- Identified possible candidates for the study
- Got informed consent from the participants
- Administered the questionnaire to the interviewees
- This was repeated for each of paired stations for five days

Main outcome measure

- Confirmation of the effect of long term bicycle riding on erectile function among boda boda taxi riders in Bungoma town.

VARIABLES

Sociodemographic factors

- Age

- Marital status
- Educational level
- Religion
- Other occupation
- Alcohol intake
- Smoking

Type of bicycle

- Bicycle seat type
- Power system of the bicycle

Sexual history profile

- Erectile function index
- Quality of erection
- Erection hardne

OPERATIONAL DEFINITIONS

Erectile dysfunction: inability to maintain or have an erection that is firm enough for intercourse. 10.4% of men at any one time may experience erectile dysfunction.

Primary erectile dysfunction: never before had an erection.

Secondary erectile dysfunction: ability to have an erection and intercourse in the past but cannot now.

TERM	DEFINITION
Sexual intercourse	Successful vaginal penetration
Sexual stimulation	Fore play

DATA COLLECTION AND ANALYSIS

Data was analyzed using SPSS V. 16.0. Data was cleaned by running frequencies and all missing values were checked and corrected by referring to the questionnaires. Descriptive statistics was carried out for both count variables (age, duration of riding, or cutting sugarcane)and categorical variables. Measures of central tendency and dispersion were calculated for continuous variables. Some of the continuous variables were categorized to calculate proportions. Chi square test (Mantel Haensen summary chi square test) was used to compare proportions and grouped variables. All significant variables in univariate analyses were analyzed by multivariate models to determine independent predictors of effect on erectile function.

EPI INFO 3.3.2 February 2005 was used to calculate Odds ratio of the effect of alcohol intake and smoking on erectile function in two study groups.

Significance was set at a= 0.05.

Qualitative analysis was done thematically with some quotes of key informants.

STUDY LIMITATIONS

- Male sexual dysfunction due to other causes such as, fatigue and marital disharmony was not be factored.
- No etiological classification was derived from the IIEF, QEQ and EHS scores.
- Subjectivity of the issue.
- Embarrassment may have led to under or over reporting.

ETHICAL CONSIDERATIONS

The study was reviewed and approved by Kenyatta National Hospital research committee.

Informed consent was obtained by the research assistants and principal investigator from the respondents that participated in the study. Subjects were free to withdraw from the study if they so wished and without any consequences. No participant was denied the required medical assistance even if he declined to participate. Similarly no special treatment was accorded those who consented to the study as a reward for their participation. There were no direct benefits to those participants agreeing to participate and no one was coerced by any means to join in the study. However, those who needed intervention were referred for specialized care by andrologist in Kenyatta national hospital or urologist in Moi teaching and referral hospital. The referral letter shown in appendix 3 was used.

RESULTS:

A total of 230 participants were interviewed, the mean age for bicycle taxi riders was 27.69 years and 82.6% of them were married. The mean age of sugarcane cutters was 29.26 years and 99.1% of them were married.

Sociodemographic features

Table 1. Socio-demographic characteristics of the study population.

CHARACTERISTIC	FREQUENCY(%)	DIFFERENCE	
	BODA BODA(n=115)	CANE CUTTERS(n=115)	P VALUE
AGE IN YEARS			
≤28	71(61.7%)	61(53%)	
>28	44(38.2%)	54(47%)	
AGE OF SPOUSE(YEARS)			
≤25	63(54.8%)	68(59.1%)	0.502
>25	52(45.2%)	52(45.2%)	
MARITAL STATUS			
Cohabiting	1(0.9%)	0(0%)	0.874
Married	95(82.6%)	114(99.1%)	
Separated	9(7.8%)	1(0.9%)	
Devorced	7(6.1%)	0(0%)	
Widower	3(2.6%)	0(0%)	
LIVING WITH SPOUSE			
Yes	102(88.7%)	110(95.7%)	0.862
No	13(11.3%)	5(4.3%)	
HAVE OTHER PARTNERS?			
Yes	27(23.5%)	56(48.7%)	0.923
No	88(76.5%)	59(51.3%)	
EDUCATION LEVEL			
≤secondary school	100(87%)	104(90.4%)	0.932
>secondary school	15(13%)	11(9.6%)	
RELIGION			
Christian	99(86.1%)	104(90.4%)	0.885
Non Christian	16(13.9%)	11(9.6%)	
SPOUSE OCCUPATION			
Employed	7(6.1%)	6(5.2%)	0.929
Unemployed	108(93.9%)	109(94.7%)	
LENGTH OF MARRIAGE			
≤4 years	64(55.7%)	58(50.9%)	0.373
>4 years	51(44.3%)	57(49.1)	

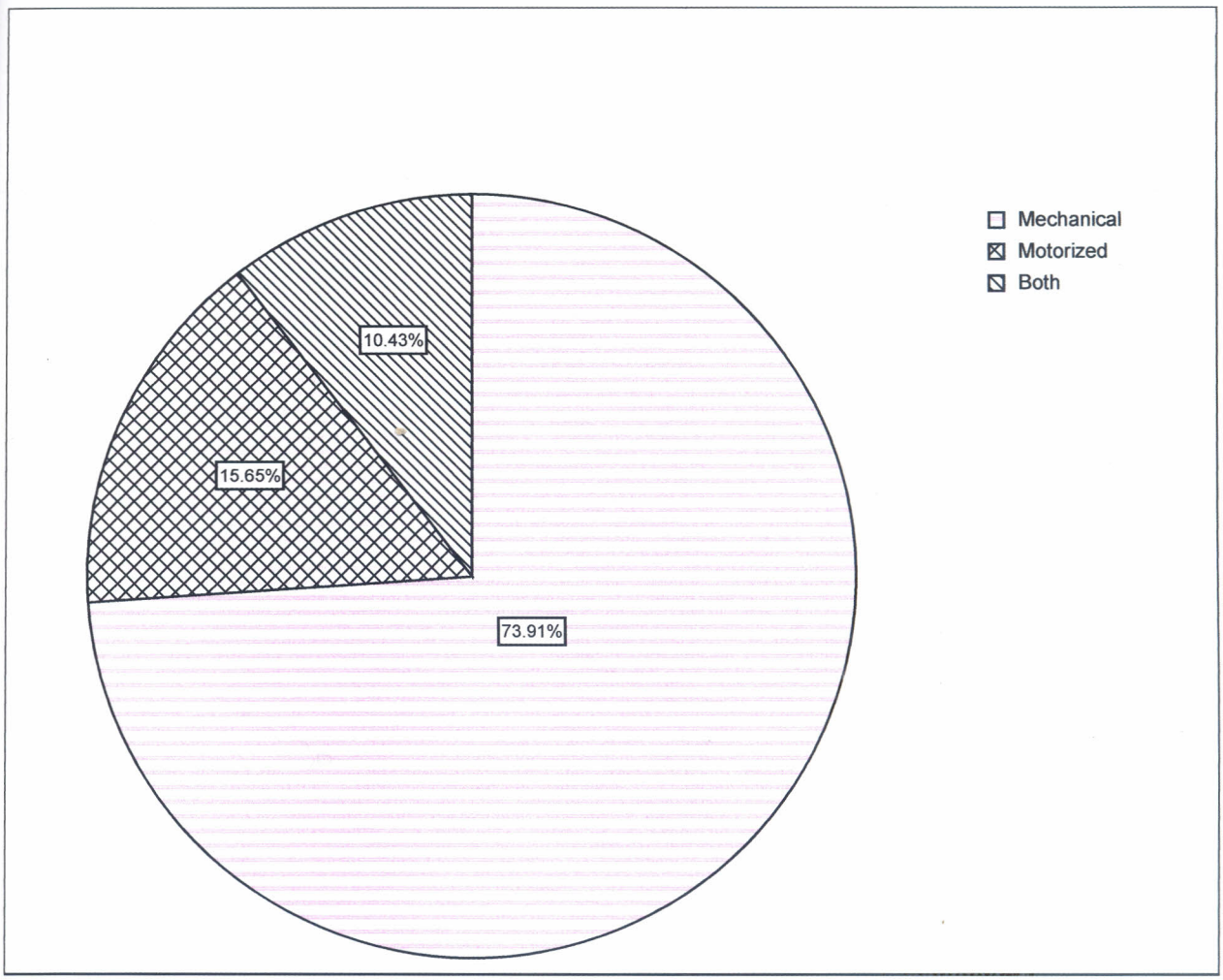
There was no statistical difference in socio-demographic characteristics between bicycle taxi riders and the sugarcane cutters.

TABLE 2. - RISK FACTOR CHARACTERISTICS

CHARACTERISTIC	FREQUENCY (%)		DIFFERENCE
	BODA BODA(n=115)	CANE CUTTERS(n=115)	P value
TAKING ALCOHOL			
Yes	66(57.4%)	70(60.9%)	0.924
No	49(42.6%)	45(39.1%)	
TYPE OF ALCOHOL			
Bottled	13(18.6%)	8(10.4%)	0.914
Unbottled	57(81.4%)	69(89.6%)	
QUANTITY TAKEN			
≤2 units	33 (49.3%)	39(50.3%)	0.834
>2 units	37(50.7%)	38(49.7%)	
FREQUENCY OF TAKING ALCOHOL			
Daily	25(39.2%)	2026%)	0.743
Occasionally	45(60.8%)	57(74%)	
SMOKING			
Yes	32(27.8%)	33(28.7%)	0.918
No	83(72.2%)	82(71.3%)	
TYPE SMOKED			
Cigarettes	30(85.7%)	31(83.8%)	0.823
Others	5(14.3%)	6(16.2%)	

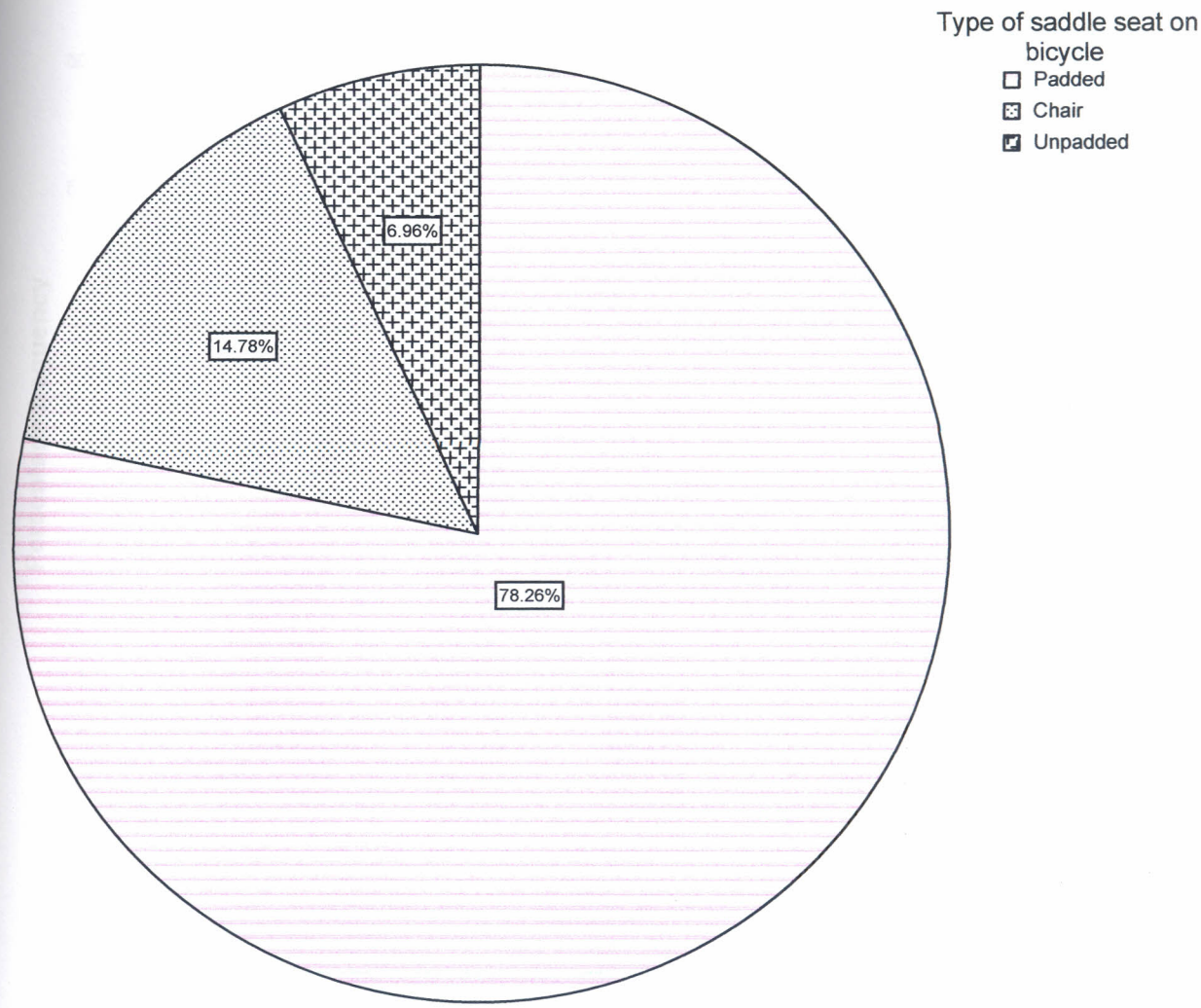
There was no statistically significant difference in the intake of alcohol or smoking habits of both Boda boda riders and Sugarcane cutters.

Figure 1.Type of Bicycle:



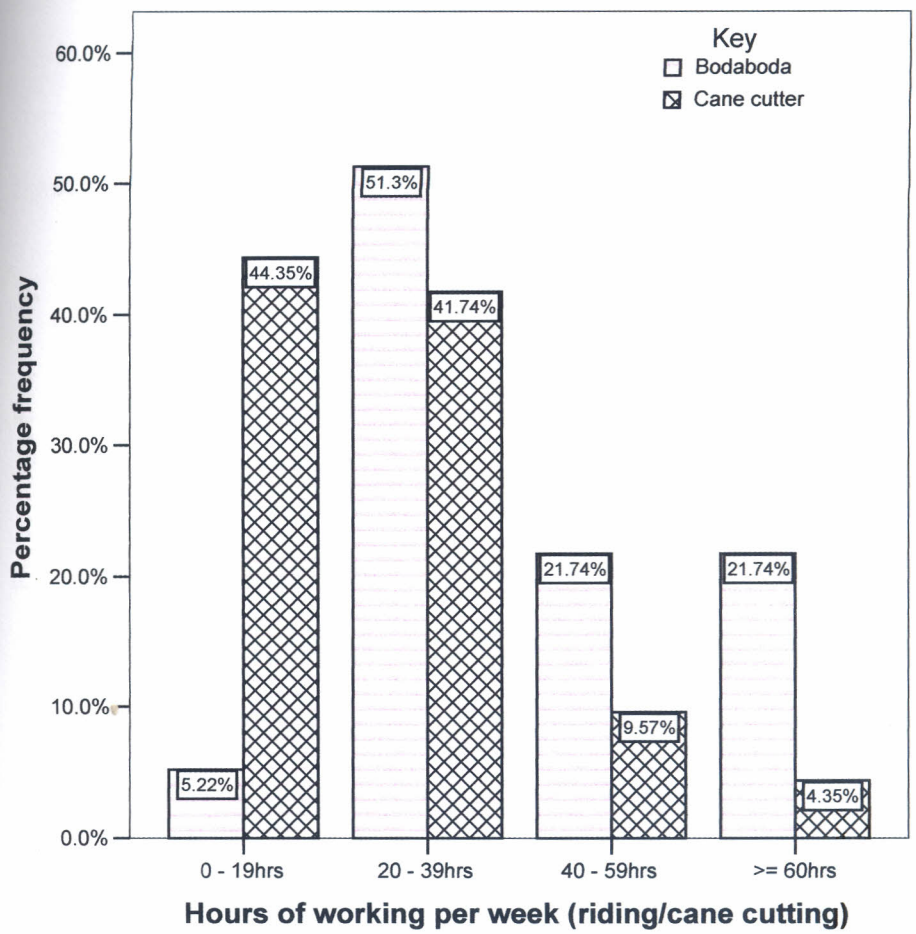
Majority of Boda boda riders used non-motorized bicycles (73.9%)

Figure 2. Type of saddle seat on the bicycle.



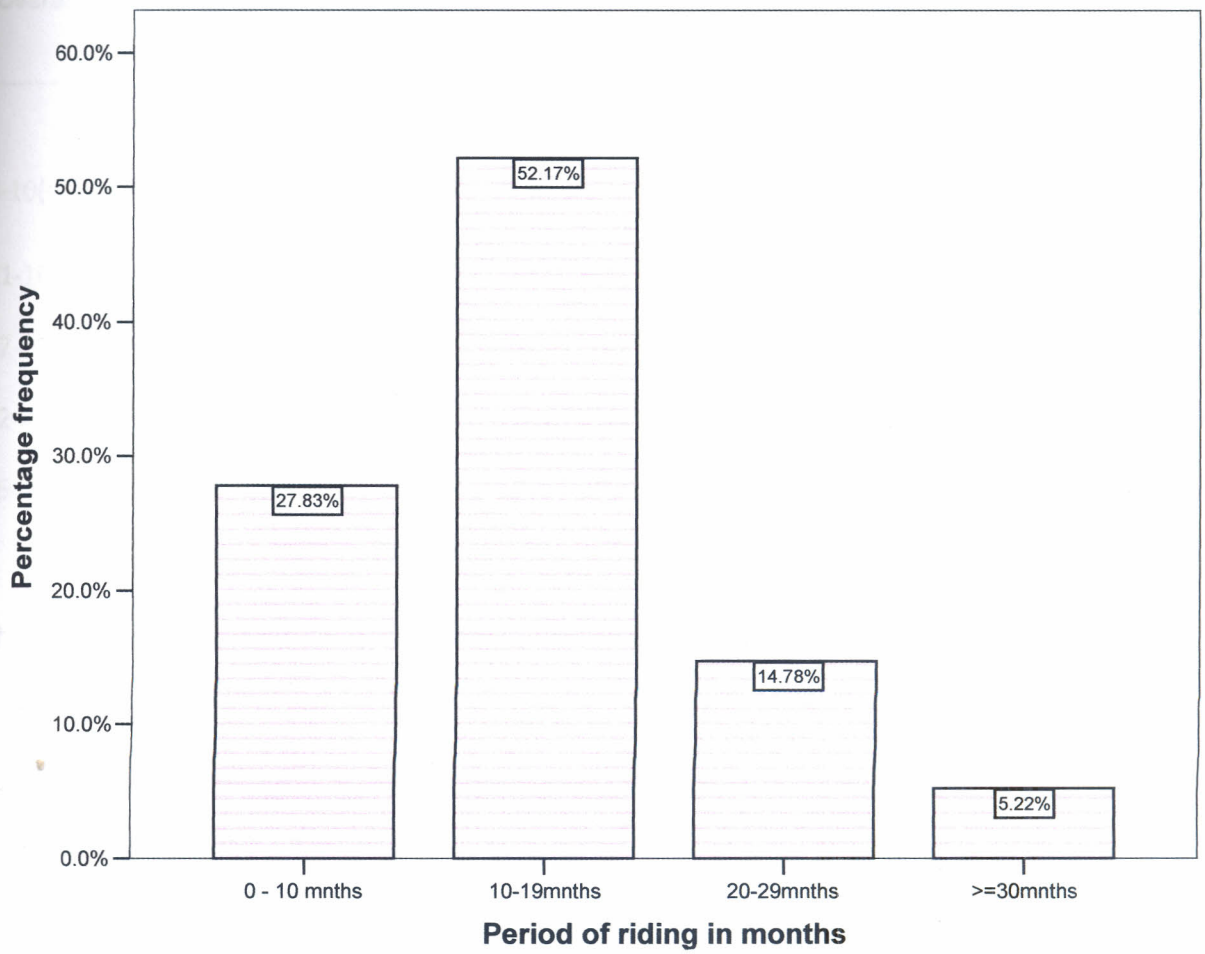
Majority of the boda boda riders (78.26%) used padded seat bicycles

Figure 3.Length of working per week in hours.



Majority of Boda boda riders worked for longer hours per week (>40hours), than sugarcane cutters.

Figure 4. Period of Boda boda riding in months



Majority of Boda boda taxi riders had been in the business for 10-19 months.

Table 3. Rates of erectile dysfunction among Boda boda riders and cane cutters

Overall Erectile function score	Frequency (%)	
	Bodaboda(n=115)	Cane cutters(n=115)
6-10(severe dysfunction)	7(6.1%)	8(7.0%)
11-16(moderate dysfunction)	34(29.6%)	31(27.0%)
17-21(mild-moderate dysfunction)	38(33.0%)	32(27.8%)
22-25(mild dysfunction)	18(15.7%)	19(16.5%)
26-30(normal function)	18(15.7%)	25(21.7%)

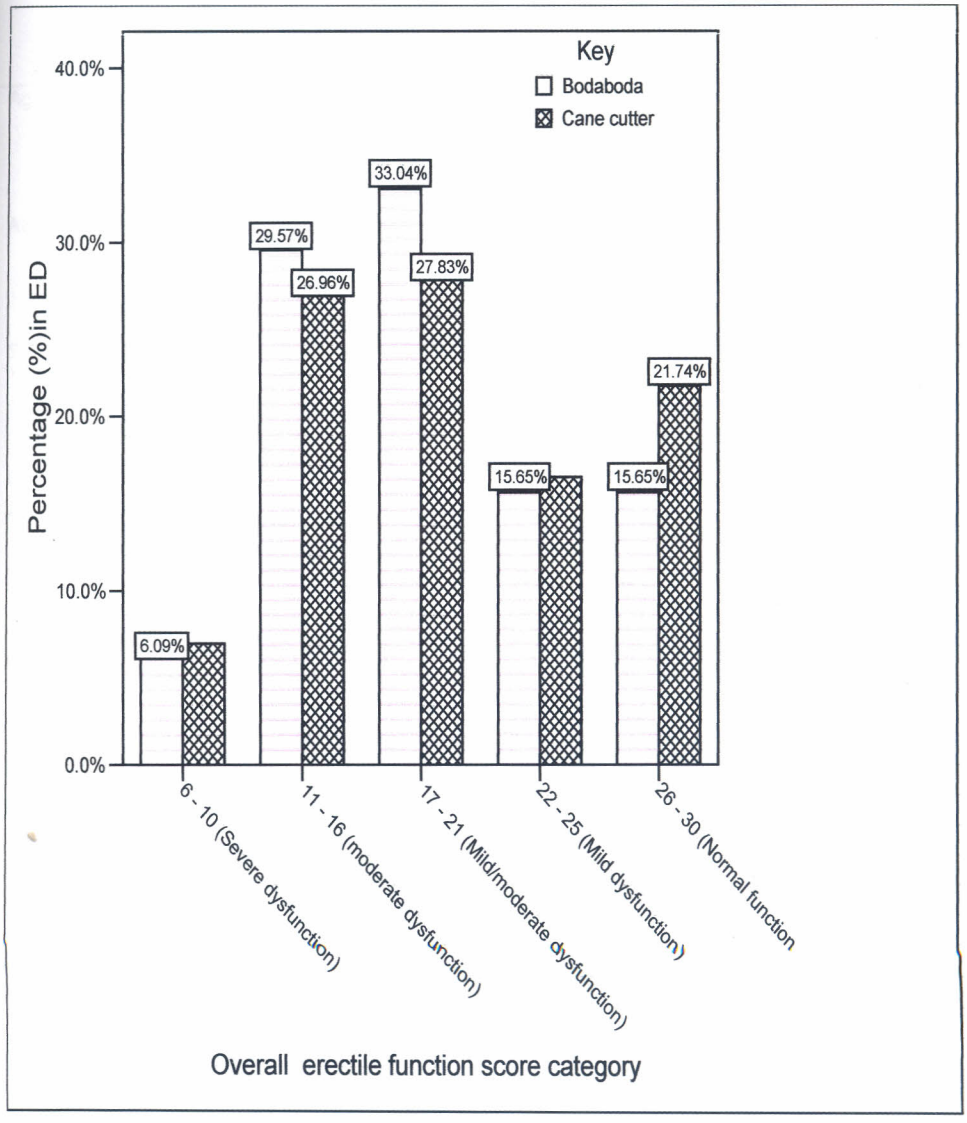
There was no significant difference between boda boda and sugarcane cutters on ED.

Table 4. Comparison of rates of erectile dysfunction between Boda boda riders and cane cutters.

Overall Erectile function score	Frequency (%)				
	Boda boda(n=115)	Cane cutters(n=115)	P value	Odds Ratio	CI (95%)
6-10(severe dysfunction	7(6.1%)	8(7.0%)	0.787	0.87	0.27 -2.75
11-16(moderate dysfunction)	34(29.6%)	31(27.0%)	0.660	1.14	0.62 – 2.10
17-21(mild-moderate dysfunction	38(33.0%)	32(27.8%)	0.390	1.28	0.70 – 2.34
22-25(mild dysfunction)	18(15.7%)	19(16.5%)	0.858	0.94	0.44 – 2.00
26-30(normal function	18(15.7%)	25(21.7%)	0.237	0.67	0.32 – 1.37

There was no significant difference in the rates of erectile dysfunction between Boda boda riders and Cane cutters.

Figure 5. Percentage erectile dysfunction in Bodaboda and cane cutters



The prevalence of severe erectile dysfunction was equal among Boda boda and sugarcane cutters (6.09%), with more Boda boda riders suffering mild to moderate erectile dysfunction than sugarcane cutters.

Table 5 Correlation of Overall erectile function score and risk factors among Boda boda.

	Score	6-10 severe dysfunction	11-16 moderate dysfunction	17-21 mild/moderate dysfunction	22-25 mild dysfunction	26-30 normal function	P value
Age	≤28	5(71.4\\50	19(55.9%)	23(60.5%)	11(61.1%)	13(72.2%)	0.802
	>28	2(28.6%)	15(44.1%)	15(39.5%)	7(38.9%)	5(27.8%)	
Alcohol intake	Yes	4(57.1%)	20(58.8%)	20(52.6%)	12(66.7%)	10(55.6%)	0.904
	No	3(42.9%)	14(41.2%)	18(47.4%)	6(33.3%)	8(44.4%)	
Smoking	Yes	3(42.9%)	9(26.3%)	10(26.3%)	5(27.8%)	5(27.8%)	0.930
	No	4(57.1%)	25(73.5%)	28(73.7%)	13(72.2%)	13(72.2%)	
Period of riding in months	0-9	1(14.3%)	14(41.2%)	9(23.7%)	3(16.7%)	5(27.8%)	
	10-19	5(71.4%)	16(43.1%)	25(65.8%)	7(38.9%)	7(38.9%)	0.094
	20-29	1(14.3%)	3(8.8%)	3(7.9%)	5(27.8%)	5(27.8%)	
	≥30	0(0%)	1(2.9%)	1(2.6%)	3(16.7%)	1(5.6%)	
Length of riding in hours/week	0-19	0(0%)	0(0%)	1(2.6%)	4(22.2%)	1(5.6%)	
	20-39	3(42.9%)	13(38.2%)	22(57.9%)	8(44.4%)	13(72.2%)	
	40-59	2(28.6%)	9(26.5%)	4(10.5%)	6(33.3%)	4(22.2%)	**0.000**
	≥60	2(28.6%)	12(35.3%)	11(28.9%)	0(0%)	0(0%)	
Type of bicycle used.	Mechanical	4(57.1%)	23(67.6%0	29(76.3%)	11(61.1%)	18(100%)	
	Motorized	3(42.9%)	7(20.6%)	4(22.2%)	4(22.2%)	0(0%)	0.084
	Both	0(0%)	4(11.8%)	5(13.2%)	3(16.7%)	0(0%)	
Type of bicycle seat saddle used.	Padded	5(71.4%)	26(76.5%)	28(73.7%)	15(83.3%)	16(88.9%)	
	Unpadded	1(14.3%)	2(5.9%)	4(10.5%)	1(5.6%)	0(0%)	0.890
	Chair	1(14.3%)	6(17.6%)	6(15.8%)	2(11.1%)	2(11.1)	

Longer hours of riding per week were significantly associated severe erectile dysfunction.

Table 6 Correlation of Overall quality of erection category and risk factors Boda boda.

		Severe ED	Normal	P value
Age	≤28	28(68.3%)	43(58.1%)	0.282
	>28	13(31.7%)	31(41.9%)	
Alcohol	Yes	23(56.1%)	43(58.1%)	0.835
	No	18(43.9%)	31(41.9%)	
Smoking	Yes	11(26.8%)	21(28.4%)	0.859
	No	30(73.2%)	53(71.6%)	
Period of riding in months	0-9	14(34.1%)	18(24.3%)	
	10-19	19(46.3%)	41(55.4%)	0.718
	20-29	6(14.6%)	11(14.9%)	
	≥30	2(4.9%)	4(5.4%)	
Length of riding in hours/week	0-19	0(0%)	6(8.1%)	
	20-39	20(48.8%)	39(52.7%)	
	40-59	10(24.4%)	15(20.3%)	0.224
	≥60	11(26.8%)	14(18.9%)	
Type of bicycle used.	Mechanical	25(61.0%)	60(81.1%)	
	Motorized	10(24.4%)	8(10.8%)	0.046
	Both	6(14.6%)	6(8.1%)	
Type of bicycle seat saddle used.	Padded	29(70.7%)	61(82.4%)	
	Unpadded	4(9.8%)	4(5.4%)	0.342
	Chair	8(19.5%)	9(12.2%)	

Non-motorized bicycles were significantly associated with severe erectile dysfunction.

Table 7 Correlation of Hardness of erection score and risk factors

	Score	0	1	2	3	4	P value
Age	≤28	1(100%)	6(85.7%)	10(55.6%)	6(60%)	48(60.8%)	0.616
	>28	0(0%)	1(14.3%)	8(44.4%)	4(40%)	31(39.2%)	
Alcohol	Yes	1(100%)	2(28.6%)	9(50%)	9(90%)	45(57.0%)	0.096
	No	0(0%)	5(71.4%)	9(50%)	1(10%)	34(43.0%)	
Smoking	Yes	0(0%)	0(0%)	5(27.8%)	3(30%)	24(30.4%)	0.499
	No	1(100%)	7(100%)	13(72.2%)	7(70%)	55(69.6%)	
Period of riding in months	0-9	1(100%)	2(28.6%)	6(33.3%)	1(10%)	22(27.8%)	
	10-19	0(0%)	3(42.9%)	8(44.4%)	7(70%)	42(53.2%)	0.767
	20-29	0(0%)	1(14.3%)	4(22.2%)	1(10%)	11(13.9%)	
	≥30	0(0%)	1(14.3%)	0(0%)	1(10%)	4(5.1%)	
Length of riding in hours/week	0-19	0(0%)	0(0%)	0(0%)	1(10%)	5(6.3%)	
	20-39	0(0%)	2(28.6%)	10(55.6%)	6(60%)	41(51.9%)	0.525
	40-59	1(0%)	2(28.6%)	2(11.1%)	2(20%)	18(22.8%)	
	≥60	0(0%)	3(42.9%)	6(33.3%)	1(10%)	15(19%)	
Type of bicycle used.	Mechanical	1(100%)	6(100%)	12(66.7%)	6(60%)	60(75.9%)	
	Motorized	0(0%)	0(0%)	5(27.8%)	0(0%)	13(16.5%)	0.05
	Both	0(0%)	0(0%)	1(5.6%)	4(40%)	6(7.6%)	
Type of bicycle seat saddle used.	Padded	0(0%)	5(71.4%)	13(72.2%)	9(90%)	63(79.7%)	
	Unpadded	1(100%)	1(14.3%)	2(11.1%)	0(0%)	13(16.5%)	0.146
	Chair	0(0%)	1(14.3%)	3(16.7%)	1(10%)	3(3.8%)	

Non-motorized bicycles were significantly associated with poor erectile hardness score.

Table 8.Correlation of sexual characteristics and erectile function score among boda boda.

Characteristic	Score	6-10 severe dysfunction	11-16 moderate dysfunction	17-21 mild/moderate dysfunction	22-25 mild dysfunction	26-30 normal function	P va
Level of sexual desire	low	5(4.4%)	17(14.7%)	15(13.0%)	3(2.6%)	0(0%)	0.00
	high	2(1.7%)	17(14.7%)	23(19.9%)	15(13.0%)	18(15.7%)	
Overall satisfaction with sex life	Very dissatisfied	7(6.1%)	16(13.9%)	16(13.9%)	3(2.6%)	0(0%)	0.00
	satisfied	0(0%)	18(15.6%)	22(19.1%)	15(13.0%)	18(15.6%)	
Satisfactory sexual relationship with spouse	Very dissatisfied	5(4.4%)	20(17.4%)	3(2.6%)	2(1.7%)	0(0%)	0.00
	satisfied	2(1.7%)	14(14.1%)	35(30.4%)	16(14.0%)	18(15.6%)	

The level of sexual desire, overall satisfaction with sexual life and satisfactory relationship with spouse were significantly associated with the erectile function score. Those with higher scores had higher levels of sexual desire and satisfactory sexual life.

Table 9. Correlation of sexual characteristics and overall quality of erection among boda boda.

Characteristic		Severe ED	Normal	P value
Level of sexual desire	low	27(23.5%)	13(11.3%)	0.000
	high	14(12.2%)	61(53.1%)	
Overall satisfaction with sex life	Very dissatisfied	23(20.0%)	19(16.5%)	0.006
	satisfied	18(15.6%)	55(47.8%)	
Satisfactory sexual relationship with spouse	Very dissatisfied	23(20.0%)	7(6.1%)	0.000
	satisfied	18(15.6%)	67(53.1%)	

There was significant association between the level of sexual desire, the overall satisfaction with sex life and satisfactory sexual relationship with spouse, with the overall quality of erection among Boda boda riders.

Table 10. Correlation of sexual characteristics and hardness of erection score among boda boda.

Characteristic	Score	0	1	2	3	4	P val
Level of sexual desire	low	1(0.9%)	7(6.1%)	11(9.5%)	4(3.5%)	17(14.8%)	0.0
	high	0(0%)	0(0%)	7(6.0%)	6(6.2%)	62(63.5%)	
Overall satisfaction with sex life	Very dissatisfied	1(0.9%)	5(4.4%)	10(8.7%)	4(3.5%)	22((18.7%)	0.0
	satisfied	0(0%)	2(1.8%)	8(6.9%)	6(6.2%)	57(49.6%)	
Satisfactory sexual relationship with spouse	Very dissatisfied	1(0%)	5(4.8%)	8(6.9%)	3(2.6%)	13(11.3%)	0.0
	satisfied	0(0%)	2(1.8%)	10(8.7%)	7(6.0%)	66(57.4%)	

Higher erectile hardness scores were associated with higher levels of sexual desire, overall satisfaction with sex life and satisfactory sexual relationship with spouse.

DISCUSSION:

This was a cross-sectional comparative study evaluating the effect of long term bicycle(boda boda) riding on erectile function and comparing the prevalence of erectile dysfunction between the bicycle taxi riders and sugar cane cutters in Bungoma town. The sample size was 230 participants.

The study groups had comparable age, age of their spouses and marital status except for one bicycle taxi rider who was cohabiting, nine were separated, seven divorced and three widower(table 1).

Majority lived with their spouses (table 1). Those who had other sexual partners had a significant association with erectile function(Tables 5,6,7), the overall quality of erection and the hardness of erection score. There was significant difference among boda boda riders with other sexual partners and those without other spouses in; erectile function $p<0.05$, overall quality of erection $p<0.05$, Hardness of erection score $p<0.05$. Having other sexual partners was associated with increased risk of erectile dysfunction. In their study, among the Ariaal of northern Kenya, 2002, (32), P Gary and co workers, showed a significant relationship between the number of spouses and erectile dysfunction ($p<0.05$), there was increased reporting of erectile dysfunction among men with multiple spouses.

Bicycle taxi riders (boda boda), who had other occupations had a significant difference with those doing only boda boda business in terms of; erectile function $p<0.05$, with having other occupation being associated with higher risk of ED (Tables 5,6,7). However there was no significant difference in terms of quality of erection and hardness of erection.

There was no significant difference in the length of marriage and the erectile function, quality of erection and the erection hardness score among the bicycle taxi riders (Tables 5, 6, 7).

Taking alcohol or smoking was not significantly associated with erectile dysfunction (Tables 5, 6, 7). However, E Oksuz and colleagues (33), 2005, found alcohol intake and smoking as the most important risk factors for erectile dysfunction. The type of bicycle used was significantly associated with the quality of erection $p<0.05$, hardness of erection score $p<0.05$ (Tables 5, 6, 7).Those who used mechanical (none motorized) bicycles had an increased risk of ED. This may be attributed to increased compression of perineal vessels and nerves predisposed by riding mechanical bicycles. In their study Dettori JR and colleagues (34), showed association

between bicycle characteristics and risk of erectile dysfunction, with prevalence higher in mechanical bikes. Those who rode non- motorized bicycle expressed concern about the weakness of their sex organ. One of them had the following comment "It is stressful physically and reduces sexual performance". There was no significant association between erectile function, quality of erection and the hardness of erection with the type saddle seat used on the bicycle (tables 5, 6, 7). Taylor and colleagues (32), 2004, found that measures thought to reduce the risk of erectile dysfunction – like padded saddle seats, padded shorts, elongated "aero bar" handles- didn't work.

The overall prevalence of ED among boda boda riders based on international index of erectile function score was 35.7% (Table 3,Figure 5), which corresponds to the findings in; Sexual dysfunction in the U.S survey; prevalence and predictors of 31%(7). The study by E Oksuz and colleagues (33), 2005, showed a prevalence of ED of 33% among Turkish men aged 20 – 40 years. The period of riding in months was not significantly associated with ED, but there was a strongly significant association between the length of riding in hours per week and the erectile function $p<0.01$(Table 5). The risk of erectile dysfunction increased as the length of riding increased. None of those who rode more than 60 hours a week had normal erectile function. In a study of erectile dysfunction after long distance cycling(31),(Joseph R. and colleagues, 2004) showed 31% prevalence of erectile dysfunction among 463 cyclists(RR 4.4 95% CI 1.6-2.7). Most recommended that those entering into the boda boda business should minimize the number of hours they ride daily in order to maintain their sexual function. Asked why, one commended that, "I have separated twice due my inability to perform since I started this business".

The lack of association between period of riding and ED may have been due to intermittent breaks taken by the boda boda riders from this business allowing recovery from exhaustion and perineal injuries from the bicycle seats. In their study, Joseph R and colleagues (31) also found the cumulative incidence of ED reduced as the duration of rest from riding increased.

The overall prevalence of ED among the sugar cane cutters was 34.0 %(Table 3, figure5), which is not significantly different from the Boda boda riders. Taylor JA and others (32) in 2004 showed that overall prevalence of ED in the cycling community did not appear to be greater than in the general population. There was a strong association between erectile function

and the length of cutting sugarcane in hours per week $p<0.01$. Those who cut for more than 60 hours per week had the highest risk of having erectile dysfunction.

The level of sexual desire among Boda boda riders was significantly associated with; erectile function $p<0.01$, the quality of erection $p<0.01$(Table 8, 9). Those with low erectile function scores and poor quality of erection among the boda boda riders had very low levels of sexual desire. The overall satisfaction with sex life of the boda boda riders had significant association with erectile function score $p<0.01$, the quality of erection $p<0.01$, and the hardness of erection score $p<0.01$(Tables 8, 9, 10). Those with low scores were very dissatisfied with their sex life. Satisfactory sexual relationship with the partners of the boda boda riders was strongly associated with; the erectile function score $p<0.01$, the quality of erection $p<0.01$, and the hardness of erection score $p<0.01$(Tables 8, 9, 10). Those with low erectile function score were very dissatisfied with their sexual relationship. *N.Schlimmer and colleagues (34),(2008),* demonstrated significant relationship between levels of sexual desire, intercourse satisfaction, satisfactory sexual relationships with the erectile function score, quality of erection and erection hardness score ($p>0.05$)

Majority of those with erectile dysfunction (41 boda boda riders) only 13 (31.7%) had sought treatment, with 84.6% seeking treatment from local herbalist and 15.4% had been attended by a general practitioner. All those who sought treatment at herbalist were given herbal medicine and none was referred for specialized care. During the study 81 participants were referred to urologists in Moi teaching and referral hospital. Both were from the boda boda and sugar cane cutters groups. Omar Egesah and colleagues (35), 2005, found that most men in Bungoma district sought traditional herbal remedies for both sexually related ailments and circumcision due to cultural believes and cost of treatment.

CONCLUSION

- Longer hours of bicycle riding per week were associated with greater risk of erectile dysfunction.
- Non motorized bicycles were significantly associated with erectile dysfunction.
- The overall risk of erectile dysfunction among boda boda riders was not significantly different from that among sugar cane cutters.
- Higher scores of erectile function, quality of erection and the erection hardness score were significant predictors of sexual desire, overall satisfaction with sexual life and satisfactory sexual relationships with spouses among the boda boda riders.
- Majority of boda boda riders with erectile dysfunction consulted local herbalists and received herbal treatment.

RECOMMENDATIONS

- Promotion of the use of motorized bicycle taxis should encouraged.
- Bicycle riders should be counseled to work for less hours and rest more to decrease the risk of ED and increase marital sexual satisfaction.
- Local health personnel should be educated on the risk factors and management of ED.

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APPENDIX 1

INFORMED CONSENT FORM

Study title; Evaluation of prevalence of erectile dysfunction among bicycle taxi riders in Bungoma town.

Date ...../.... /.....(day, month,year)

Interviewee's serial number.....

Investigator's name.....

This is to request you to participate in a study to evaluate the impact of long term bicycle riding /sugarcane cutting on erectile function. This study is partly for the fulfillment for a ward of degree in master of medicine in obstetrics and gynecology of university of Nairobi. If you agree to take part in the study, we will ask you some questions.

By participating in this study you will help in gathering research information about erectile dysfunction arising from long term bicycle riding or heavy mechanical work hence help finding solutions to this problem. In process of gathering this information, we will offer you free medical consultation and education about sexual disorders and available treatment options. There will be no direct material gain to you for participating in this study.

There are no risks involved for participating in this study but some questions about your social, sexual life and economic status may make you uncomfortable. Your participation is entirely voluntary and you have the right to refuse to participate or terminate the interview at any point if you feel uncomfortable. This will not have any effect on the services that you are entitled to receive. The information you provide during the study will be kept confidential at all times. We will not use your name during the study and thereafter during analysis and dissemination of data.

DECLARATION

Investigators statement;

I have explained to the respondent the nature and purpose of the study as described above. I have asked the subject if there are any further questions and I have answered them to the best of my knowledge and ability.

Signature of investigator.....

Contact; cell phone 0722352195. Address; p.o box 7917, Eldoret, Kenya.

Interviewee's statement

I, ...ID. No.....

Of..... Do hereby consent to participate in the study to evaluate the effect boda boda riding/sugarcane cutting on erectile function. The study has been explained to me by Dr/Mr./Ms.....

And no material gain has been suggested in order for me to participate in this study.

Signed.....(self/guardian)

APPENDIX 2

DATA COLLECTION FORM/QUESTIONNAIRE

Please circle the response where applicable.

Interviewee no..... Interviewer's no.....

code.....

Date.....

SOCIO-DEMOGRAPHIC DATA

1. Age (in years) .....

2. Marital status;1) cohabiting

   2) Married

   3) Separated

   4) Divorced

   5) Widower

3. Are you staying (living) together with your spouse/partner?

   1) Yes 2) no

4. Do you have other partners other than your wife?

   1) Yes 2) no

5. Education.....1) primary (specify class).....

   2) Secondary (specify class).....

   3) college/university.....

6. Religion: 1) Christian (specify denomination).....

   2) Muslim

   3) Other (specify).....

7. Other occupations (specify).....

8. Age of spouse/partner.....

9. Occupation of spouse/partner.....1) employed 2) business 3) unemployed ☐

10. How long is the marriage (in years).....?

11. Do you take alcoholic drinks? 1) Yes 2) No ☐

If yes, which one? 1) Beer 2) chang'aa 3) busaa 4) others; specify..... ☐

How many bottles/mugs/glasses (of 500mls) do you take in a single sitting? 1) One 2) two 3) three ☐

4) More than three.

12. How often do you take alcohol? 1) Daily 2) three times per week 3) more than three times per week ☐

13. Do you smoke? 1) Yes 2) No ☐

If yes, which one? 1) Tobacco pipe 2) cigarettes 3) cigars 4) Marijuana

14. How many do you smoke per day ?.....

B. TYPE OF BICYCLE TAXI

(For sugarcane cutters go to question 20)

15. What type of bicycle do you use?

1) Mechanical

2) Motorized ☐

3) Both

16. How long have you been doing boda boda business in months?

17. What type of seat is your bicycle saddle?

1) Padded

2) Chair

3) Unpadded

18. What do you carry on your bicycle? 1) People only 2) people and luggage 3) luggage only.

19. What number of hours per week do you ride?.....

20.How long have you been cutting sugarcane?.....

21. What number of hours per week do you cut sugarcane?.....

C. SEXUAL HISTORY ***section A***

To assess the erectile function, the international index of erectile function questionnaire was used. Validated by Rosen RC, Riley A,Wagner G, et.al. The international Index of Erectile function (IIEF): a multidimensional scale for assessment of erectile dysfunction. Urology 1997;49: 822-830. Please choose the appropriate column for each question about your sexual abilities over the past 4 weeks.

22. How often were you able to get an erection during sexual activity? 0=No sexual stimulation 1=Almost never/never 2= A few times(much less than half the times) 3=sometimes 4=most times 5=almost all the times

23. When you had erections with sexual stimulation, how often were your erections hard enough for penetration? 0=No sexual stimulation 1= Almost never/never 2=A few times 3=sometimes 4=most times 5=Almost always/always

24. When you attempted sexual intercourse, how often were you able to penetrate(enter) your partner? 0=Did not attempt intercourse 1=Almost never/never 2=Afew times 3= Sometimes 4=Most times 5=Almost always

25. During sexual intercourse, how often were you able to maintain your erection after you had penetrated(entered) your partner? 0=Did not attempt intercourse 1=Almost never/never 2=A few times 3=Sometimes 4=most times 5=Almost always

26. During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse? 1=Did not attempt intercourse 2=Extremely difficult 3=Difficult 4=Slightly difficult 5=Not difficult.

27. How many times have you attempted sexual intercourse? 0=No attempts 1=One to two attempts 2=Three to four attempts 3= five to six attempts 4=seven to ten attempts 5=Eleven+ attempts.

28. When you attempted sexual intercourse, how often was it satisfactory for you? 0=Did not attempt 1=Almost never/never 2=A few times 3=Sometimes 4=Most times 5=Almost always/always ☐

29. How much have you enjoyed sexual intercourse? 0=No intercourse 1=No enjoyment 2=Not very enjoyable 3=Fairly enjoyable 4= highly enjoyable 5=Very highly enjoyable. ☐

30. When you had sexual stimulation or intercourse, how often did you often did you ejaculate? 0=No sexual stimulation/intercourse 1=Almost never/never 2=A few times 3=Sometimes 4=Most times 5=Almost always/always ☐

31. When you had sexual stimulation or intercourse, how often did you have the feeling of orgasm or climax? 0=No sexual stimulation/intercourse 1=Almost never/never 2=A few times 3=Sometimes 4=Most times 5=Almost always/always. ☐

32. How often have you felt sexual desire? 1=Almost always 2= A few times 3=Sometimes 4=Most times 5=Almost always/always ☐

33.How would you rate your level of sexual desire? 1= very low or none at all 2=Low 3=Moderate 4=High 5=Very high. ☐

34.How satisfied have you been with your overall sex life? 1=very dissatisfied 2=Moderately dissatisfied 3=About equally satisfied and dissatisfied 4= Moderately satisfied 5=Very satisfied.

35. How satisfied have you been with your sexual relationship with your partner? 1=very dissatisfied 2=Moderately dissatisfied 3=About equally dissatisfied and satisfied 4=Moderately sa☐d 5=Very satisfied ☐

36. How do you rate your confidence that you could get and keep an erection? 1=Very low 2=Low 3=Moderate 4=High 5=Very high. ☐

The levels of Ed severity will be classified as; a) Normal or no ED; score, 26-30, b) Mild Ed(22-25), c) Mild to moderate(17-21), Moderate(11-16), Severe(6-10).

Section B

To assess quality of erection the QEQ questionnaire, validated by Porst H, Gilbert C, Collins S, et al. Development and validation of the the Quality of Erection Questionnaire. J sex med 2007; 4:372-381, was used.

The following questions ask about the quality of your erections over the past 4 weeks:

37. You had erections hard enough for penetration of your partner: 1=Almost never/never 2=less than half the time 3=About half the time 4= More than half the time 5=Almost always/always. ☐

38. Your ability to keep your erection to completion of sexual intercourse was: 1= very unsatisfactory 2=somewhat unsatisfactory 3=neither satisfactory or unsatisfactory 4=Somewhat satisfactory 5=very satisfactory. ☐

39. The length of time(from when you started sexual activity) until your erection was hard enough to participate in sexual intercourse was: 1=Very unsatisfactory 2=Somewhat satisfactory 3=Neither satisfactory or unsatisfactory 4=Somewhat satisfactory 5=Very satisfactory. ☐

40. The length of time you were able to be erect during intercourse was: 1=Very unsatisfactory 2=Somewhat satisfactory 3=Neither satisfactory or unsatisfactory 4=Somewhat satisfactory 5=Very satisfactory. ☐

41.The hardness of your erection was: 1=Very unsatisfactory 2=Somewhat satisfactory 3=Neither satisfactory or unsatisfactory 4=Somewhat satisfactory 5=Very satisfactory. ☐

42. The overall quality of your erction was: 1=Very unsatisfactory 2=Somewhat satisfactory 3=Neither satisfactory or unsatisfactory 4=Somewhat satisfactory 5=Very satisfactory. ☐

The QEQ is evaluated as a total score which is transformed onto a 0-100 scale, with higher score meaning higher quality of erections.

Section C

To assess erection hardness, the erection hardness score , as validated by; Mulhall JO, Goldstein I, Bushmakin A, et al. Validation of the erectile hardness score. J sex med.2007; 4: 448-464, was used.

43. How do you rate the hardness of your erection?

0: penis does not enlarge

1: penis is larger but not hard ☐

2: penis is hard but not hard enough for penetration

3: penis is hard enough for penetration but not completely hard

4: penis is completely hard and fully rigid

44. What is your advice to your friends aspiring to join this business in terms of their future sexual performance?.....

45. Have you sought any treatment, to enhance your ability erect and sustain the erection 1) Yes 2) No ☐

46. If yes, which one 1) herbalist 2) General practitioner ☐

47. What treatment were you put on 1) Herbal 2) oral medication 3) surgical 4) Not sure ☐

APPENDIX 3

REFERRAL LETTER

Participants who score less than 16 points on IIEF index will be referred by the principal investigator.

Institution/clinic referred to.....KNH/MTRH

Name..... age.....id.no.....

Diagnosis..... IIEF score.....

Brief medical history.....

Previous treatment(if any).....

Referring officer(Name).....Signature.....

KENYATTA NATIONAL HOSPITAL
Hospital Rd. along, Ngong Rd.
P.O. Box 20723-00202, Nairobi.
Tel: 2726300-9
Fax: 725272
Telegrams: MEDSUP", Nairobi.
Email: knhadmin@knh.or.ke

Ref: KNH-ERC/ 01/ 407

21st May, 2008

Dr. Wasike I. Wamalwa
Dept. of Obs. & Gynae
UNIVERSITY OF NAIROBI

Dear Dr. Wamalwa

RESEARCH PROPOSAL: "SEXUAL DYSFUNCTION AMONG BICYCLE TAXI RIDERS (BODA BODA) IN BUNGOMA TOWN" (P24/2/2008)

This is to inform you that the Kenyatta National Hospital Ethics and Research Committee has reviewed and **approved** your above revised research proposal for the period 21st May, 2008 – 20th May, 2009.

You will be required to request for a renewal of the approval if you intend to continue with the study beyond the deadline given. Clearance for export of biological specimen must also be obtained from KNH-ERC for each batch.

On behalf of the Committee, I wish you fruitful research and look forward to receiving a summary of the research findings upon completion of the study.

This information will form part of database that will be consulted in future when processing related research study so as to minimize chances of study duplication.

Yours sincerely

PROF A N GUANTAI
SECRETARY, KNH-ERC

c.c. Prof. K.M. Bhatt, Chairperson, KNH-ERC
The Deputy Director CS, KNH
The Dean, School of Medicine, UoN
The Chairman, Dept. of Obs. & Gynae, UoN
Supervisors: Dr. Cheserem, Dept. of Obs. & Gynae, University of Nairobi
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