Spatial Aspects of the Vulnerability to STD/AIDS among the Long-distance Truck Drivers in Bangladesh

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Certificate of Approval

I have the pleasure to approve the thesis entitled **"Spatial Aspects of the Vulnerability to STD/AIDS among the Long-distance Truck Drivers in Bangladesh"** of Md. Jamal Khan to be presented to the Department of Geography and Environment, Faculty of Sciences, University of Dhaka, Dhaka, in the partial fulfillment of the requirements for the Degree of Master of Philosophy.

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To my parents...

Acknowledgments

The road I have to pass over during the days after sailing of the present thesis, I was Indeed in daze_ sometime it came into sight of a mirage in the desert; sometime it became a puzzle like a endless equation. Even looking back of those days still turns me into plagued. Nevertheless, I end the trajectory. This is such a way one has to go with by the means of oneself. However, auspiciously, I was not along and first of all, I yes indeed bear in mind with my peerless esteem the name belongs to my supervisor. I, therefore, wish to express my apical gratitude to the supervisor, Professor. A Q M Mahbub, Professor, Department of Geography and Environment, University of Dhaka, who initiated me into this present research and under whose guidance, the work has been accomplished.

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Contents

Chapter 6

CONCLUSION AND POLICY RECOMMENDATION

REFERENCES

APPENDICES

Chapter 1

Chapter 2

Chapter 3

Chapter 4

AAF	AIDS Awareness Foundation
AIDS	Acquired Immune Deficiency Syndrome
AMA	American Medical Association
BAPC	Bangladesh AIDS Prevention and Control Programme
BBS	Bangladesh Bureau of Statistics
BIWTC	Bangladesh Inland Water Transport Corporation
BRTA	Bangladesh Road Transport Authority
BWHC	Bangladesh Women's Health Coalition
CARAM	Co-ordination of Action Research on AIDS and Mobility
CBOs	Community Base Organisations
CCDB	Christian Commission for Development in Bangladesh
CEDAR	Concern for Environmental Development and Research
CSWs	Commercial Sex Workers
DCC	Dhaka City Corporation
DGHS	Director General of Health Services
FCSWs	Female Commercial Sex Workers
FCSWs	Floating Commercial Sex Workers
FGG	Floating Gay Girls
FHI	Family Health International
GIS	Geographical Information Systems
GOB	Government of Bangladesh
GUD	Genital Ulcer Diseases
GUM	Genitio-Urinary Medicine
HASAB	HIV/AIDS/STD Alliance, Bangladesh
HBV	Hepatitis B Virus
HIV	Human Immuno-deficiency Virus
HTV	Heavy Transport Vehicle

ICDDR, B	International Centre for Diarrhoeal Disease Research, Bangladesh
IEDCR	Institute of Epidemiology Disease Control and Research
IV	Intra-Venous
IVDUs	Intra-Venous Drug Users
JJS	Jagrata Jubu Shangga
KABP	Knowledge Attitude Belief and Practice
MCSWs	Male Commercial Sex Workers
MRF	Mean Information Field
MSF	Mean Risk Field
NAC	National AIDS Committee
NGOs	Non Government Organisations
PDVOs	Private Development Organisations
PRA	Participatory Rural Appraisal
RRA	Rapid Rural Appraisal
RTI	Reproductive Tract Infection
SHAKTI	Stopping HIV/AIDS Through Knowledge and Training Initiative
STDs	Sexually Transmitted Diseases
TIR	Targeted Intervention Research
TK.	Taka (US $ 1= TK. 48.35 in 1998)
UN	United Nations
UNAIDS	United Nations AIDS
UNESCO	United Nations Educational Scientific and Cultural Organization
UNICEF	United Nation Children's Fund
UTI	Urinary Tract Infection
VDRL	Venereal Disease Research Laboratory
VHSS	Voluntary Health Services Society
WB	World Bank
WHO	World Health Organisation

Afim	= Opium
Bangla	= Typical country liquor from fermented rice juice
Ganja	= Marijuana
Gari	= Vehicle
Ghat	= Jetty *e.g.* ferry *ghat*
Jaysthya	= Bengali month (Mid of May to Mid of June)
Kamer Moushum	= Peak season
Kartik	= Bengali month (Mid of October to Mid of November)
Lakh	= One hundred thousand
Mal Kata	= Theft
Mazar/Darbar Sharif	= Shrine
Mora Moushum	= Off season
Ostad	= Mentor/ Master/Trainer
Pir, Fakir	= Typical eastern holy-men
Sarged	= Pupil/Student/Trainee
Tari	= Typical country liquor from fermented palm juice

AIDS: the most threatening STD, caused by the virus named **HIV**.

Binary Connectivity Matrix: in which each row and column represents a vertex or node.

Cascade Diffusion: implying a process splashing step by step down.

Core-group: people with high-risk behaviors and most vulnerable to STD/AIDS.

Diameter (δ) (of a graph): involves the counting of the number of arcs in the shortest possible path between the two farthest points on the each network group (Kansky, 1963).

Egocentric' Risk Network: those with whom a person engages directly in risk behaviors.

Follow-up System: refers to that mechanism by which the program target could be checked in chain referral process.

Formal Region: is a geographical area, which is uniform or homogeneous in terms of selected criteria (Grigg, 1967).

Functional Region: is a geographical area, which displays a certain interrelationship, an interdependence of parts, and defined on the basis of functional coherence (Grigg, 1967).

Heterosexuality: meaning that a person having multiple sex-partners.

Hidden Sex-spaces: places characterized by the concentration of unlicensed floating sex workers. This group of sex workers is neither socially recognized nor their business is permitted by the legal authority. Hence the so-called 'fallen' group and their work always tends to be located in the something mystic, underground or hidden places with peculiar timing. Therefore, termed as informal or hidden sex-spaces.

High-risk Behavior: behaviors that suspected to be the rootstock of being infected with STD/AIDS, *e.g.* heterosexuality.

HIV: human immuno-deficiency virus, which causes AIDS.

Homosexual Sex: meaning that a man having sexual relationship with man.

Homosexuality: meaning that a person having sexual relationship with single partner.

Imploded Location: relative measure of distance between two nodes in which distance has been measured in terms of network hierarchy instead of actual geographic distance

Incidence Rate (IR): is the number of new cases of a health problem that occurs in a population at risk within a specific period of time (CDC, *date not mentioned*?).

$$IR = \frac{\text{No. of new cases during a specified period of time}}{\text{Population at risk}} * 10^{n}$$

Infectability: the rate of chance of being infected with STD/AIDS.

Institutional Sex-spaces: brothel-based sex activities are somewhat formal in nature and authorized, then these spaces are more static, and easily identifiable. Therefore, termed as Institutional sex-spaces.

Inter-regional Diffusion Path: meaning the path in which an infection wave spills out from one region to others.

Inter-regional Linking Node: linking nodes by which STD/AIDS may have been diffused from one region to another region.

Intra-region Diffusion Path: meaning the paths by which diffusion of STD/AIDS likely to proceed on within a region.

***Kamer Moushum*:** meaning peak season in trucking business, which starts in the Bengali month of *Kartik* (mid of October) and lasted unto the month of *Jaysthya* (mid of May).

Lag-time: the time between contactability and the completion of index cycle of being infected.

Local and District *Gari*: new model trucks being allowed to operate on inter-district routes are called district *gari*, while trucks with old model engine registered as 'Local *Gari*'.

Local and Inter-district Trip: trips consumed less than a one-day were labelled as local and the rest are as inter-districts.

Mean Risk Field (MRF): an area, or field, in which sexual contact could occur and hence chance of STD/AIDS infection

Mobility-related-behaviors: risk behaviors that are space oriented and highly related to mobile life. Evidently truckers engage with irregularities like alcoholism and heterosexuality while they were on the way of a trip. Thus these risk behaviors are termed as 'mobility-related-behaviors'.

Monitoring: is the periodic oversight of the implementation of an activity and also useful for the systematic checking on a condition or a set of conditions,

***Mora Moushum*:** meaning dull season, which starts in *Jaysthya* (mid of May) and continues up to *Kartik* (mid of October).

O-D Matrix: tabular form of origin and destination of trucking flow.

Prevalence Rate the point of prevalence rate (PR) is the proportion of the population that has the health problem under study.

$$PR = \frac{\text{No. of specific cases at a specified point of time.}}{\text{Total population}} * 10^{n}$$

Pyramidal Chain referral Follow-up System: meaning a chain of referral system developed between different hierarchic level of vulnerable locations in the whole country for monitoring and following-up the truckers' STD/AIDS situation and interventions.

Reflective Pair: two linked nodes with equal value, which become the *K*-core of a group.

Regional K-core: the central or most accessible location of a region.

Regional Lag-times: average lag-times of all nodes of a region.

Regional Risk Value: mean of the degree of regional contactability or sexual networking

Sex Region: region (formal or Functional) of different sex-spaces.

Sex-space: space that especially organised and implicated for commercial sexual activities.

Sexual Orientation: meaning a person having sexual experience.

Sexuality: state of having sex and behaviours connecting to premarital or *extra-marital sex*.

Socio-economic Characteristics: some of the widely used demographic, social and economic indicators are labeled as 'Socio-economic Characteristics'.

Sociometric Risk Network: a pattern of relationships involving risk behaviors among large number of members of a group.

Spatial Network Intentions: an ordered and hierarchic intervention to be created in different level of vulnerable locations, which are all spatially integrated and linked-up.

Spatiometric Risk Network: sexual risk networking between different sex-spaces.

Spatio-psychometrics Analysis: analysis consists of diagonal plotting of psychological data into spatial perspective *i.e.* bridging of psychic matter of sexuality and its spatial dimension together in a common platform.

Spatio-temporal Contact Probability Field: a field in which shows the predicated times to be needed for different locations for being infected with STD/AIDS.

STD: a group of diseases acquired as a result of sexual intercourse with an infected individual or infection in neonates and infants acquired during birth from their infected mother.

STD-core: refers to that places as perceived by the victims suspecting to be experienced with the incidence of STD.

Tempo-psychometric Analysis: analysis consists of diagonal plotting of psychological data into temporal perspective *i.e.* bridging of psychic matter of sexuality and its temporal dimension together in a common platform.

Transit Points: the intermediary locations on particular routes, in which truckers have to halt for physical cause such as presence of river on the route. In other words these are ferry *ghats*.

Truck Stand: the starting and ending point as well as the intermediary stopovers on a certain route are in general known as truck stands.

Truck Stoppages: smallest, illegal and temporary stands are termed as truck stoppage. These are numerous in numbers and may grow up anywhere and anytime.

Truck Terminal: the highest order in the truck stands, characterized by large number of standing trucks and developed under formal authorization and with proper facilities.

Truck-bases: the places, at where trucks have been registered *i.e.* the original node or the ultimate destination of the concerned truck.

Truckers: people who are directly involved in trucking goods and have to move with the truck *e.g.* truck drivers and helpers.

Truckers' Mobility: refers to spatial mobility of trucker community as of their job or profession. Thus in the present study, trucker mobility are looked in the light of average frequency of business trips, its' distance, direction, duration, transition and O-D metrics *etc.*

Trucking Edges: the ending or termination points of particular truck route, characterised by land ports, seaports, or important border crossings.

Trucking Route: the trajectory, on which trucks are moving.

Trucking Space: the fields, in which trucking is concerned, are defined as 'Trucking Space'. These include truck terminal, stand, stoppage and parking lots.

Trucking Space: the fields, on which trucking is concerned. This includes truck terminal, stand, stoppage and parking lots *etc*

Vulnerability to STD/AIDS: meaning that something (place or people) at risk, by virtue of its risk behaviors (personal) or risk characteristics (spatial) that may directed to risk for being infected with STD/AIDS.

Vulnerable Regions: region at risk or vulnerable to STD/AIDS.

The issue of STD/AIDS has recently been emerging as one of the most attractive field of studies especially in the beginning of 1990s. The epidemic of AIDS has already been exposed as the most vulnerable crux for whole mankind, though it has not yet been breaking out on a deadly scale in many parts of the world like Bangladesh. Nevertheless, threatening of AIDS remains unchanged in these areas. Therefore, the phrase_ 'vulnerable to AIDS'_ is becoming a public issue, which commonly refers to several high-risk behaviors. One of such crucial is the heterosexuality prevailing in particular community by which AIDS and other simple STDs, even many infections and communicable diseases may be diffused within the whole society, especially in a conservative society like Bangladesh. On the other hand, no successful treatment or even vaccination system for STD/AIDS has yet been formulated and therefore prevention is the only way to escape one from the danger of STD/AIDS. In case of prevention of STD/AIDS, the spatial aspects of sexuality and STD/AIDS including origin of STD/AIDS, its spatial process of diffusion, vulnerable areas, locational and environmental determinant of vulnerability, are important to know. This sort of spatial information and analysis are absolutely geographical aspects of sexuality and STD/AIDS and needed to know for determining effective locations and systematic spatial arrange of prevention activities. But due to lack of systematic geographical research no spatial integrated and hierarchical arrangement of STD/AIDS intervention has yet been organized. Therefore, the present research is an academic endeavor to meet the crying need.

The study necessarily consists of three issues namely spatiality, vulnerability to STD/AIDS, and the truckers. The first one is of geographical and the next is of epidemiological. These two were fitted into each other's dimensions, in other words, the present thesis concerns with the epidemiological concepts of vulnerability to STD/AIDS, but from geographical approaches and tastes. Therefore, the research starts with the questions regarding vulnerability to STD/AIDS from geographical point of view such as what are the specific locations from where STD/AIDS may have been originated and diffused over whole country *i.e.* active origin and is there any passive location that are vulnerable to STD/AIDS; how and why a location becomes vulnerable to STD/AIDS or in other words what are the locational dynamic and environmental determinants that make the location vulnerable; what might be the spatial process of STD/AIDS diffusion, *i.e.* in which routes STD/AIDS may have transported over the country through trucker community; is there are any mobility behavior that may make a person or a group at risk; how a follow-up system can be introduced and incorporated with the STD/AIDS interventions for truckers? These questions are absolutely spatial oriented, which also in other words, of geographical seasoning. On the other hand, the

questions are much more tendered to practical or intervention needs than of problematic or academic nature of investigations.

Thus the very nature of the research persuades to follow a critical methodology, which derived from the philosophy of 'inter-looking system' where a systematic coordination has been done between inductive vs. deductive, qualitative vs. quantitative, and academic vs. practical approach. However, the study targeted the most vulnerable core group_ trucker community_ from the assumption that STD/AIDS may be diffused throughout Bangladesh by this community as like as they are transporting goods over the country. Therefore, a total of 240 samples from long-distance truck drivers were interviewed in four selected sites *viz.* Tejgaon, Aricha, Benapole and Hili located on the two nationally important truck routes in the country. Besides, necessary data were also collected from other qualitative surveys and observations.

The study revealed that the very nature of truckers' profession as well as their socio-economic background made them vulnerable to STD/AIDS. The members of this community are all at reproductive age and economically active population. Their income level was rather high than of their social status. Their level of education and consciousness, housing, communication and recreation, health care *etc.* evidenced the lower social status and this imbalance socio-economic background thus made-up their risk prone mentality. Especially income from unusual means made some of the members of the community to be habituated in risk behaviors. Even most of them had multiple sex-partners and other form of heterosexuality; but none of them used to practice safer-sex with condom; besides, alcoholism, using common saloon for shaving purposes were also common among them. Their knowledge, attitude and beliefs regarding safety health and STD/AIDS were far from the truth. Thus they are undoubtedly at risk and vulnerable to STD/AIDS as a result of their incorrect knowledge, and misconceptions, wrong attitude and beliefs and having unsafe and uncontrolled sex and other practices.

The study also unveiled the mobility behaviors of trucker community and its strong correlation with the vulnerability to STD/AIDS. It was evident that long days of absence from the family, prolonged non-stop driving hours, huge work load and travelling irritation on the road, intervening obstruction like traffic jam, presence of ferry *ghat*, police and other harassment, burglary on high way *etc.* were the striking features in trucking profession. These mobility-related features along with different locational and environmental characteristics such as presence of brothels or concentration of floating sex workers, presence of transits, edges, and stopovers in a particular location and time factor *etc.* were found to have profound influence on truckers in making decision of performing risk behaviors in that location. This is why some locations were identified to be vulnerable to STD/AIDS.

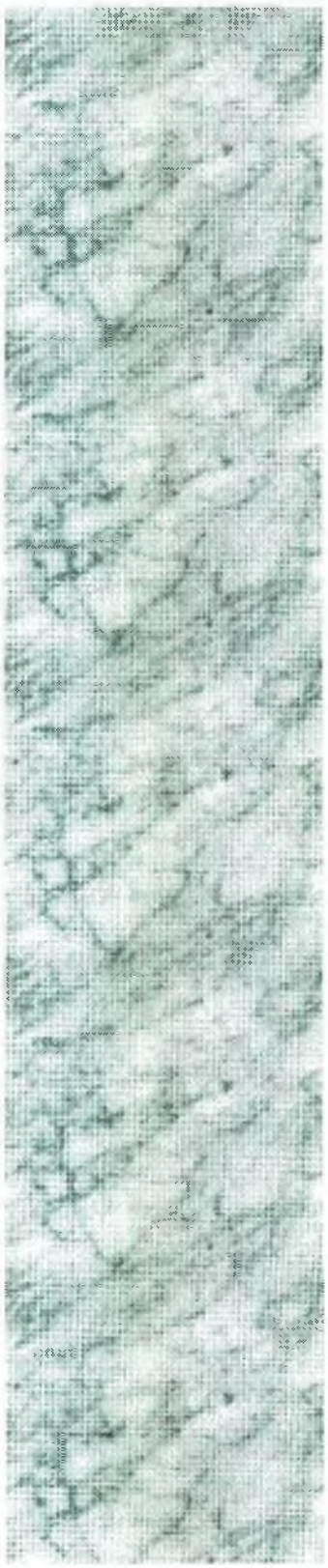
The study then explored spatiality of truckers' vulnerability to STD/AIDS, which shows that truckers risk behaviors are essentially space and time oriented, thus introduced some new terms and concepts such as sex-spaces, its temporality and spatial networks *etc.* The data showed that country's recognized brothels were played as institutional sex-spaces for truckers. These locations are also found as the origin of STD (active origin) for the truckers. Besides there were other hidden sex-spaces mostly located in big cities, *ghats*, stopovers, and other truckers' spots. These locations were also exposed to be the potential origin of STD (passive origin) for truckers. The study further explored a distinct, mappable and hierarchic pattern of risk networks between different sex-spaces as well as explained how this had been developed by the trucker community. With this data the study then simulated the potential flow of spatial diffusion of AIDS, its chance of infection, and time to be needed for spreading the epidemic. The analysis showed that the epidemic wave might follow the degree of contactability of different sex-spaces, which was directly involved with the truckers' spatial pattern of mobility.

Finally, the study suggested for spatial organization of preventive interventions for the trucker community. This organization must be spatially ordered and be hierarchical shaped. This sort of spatial planning of intervention, however, was expected not only to save cost and program overlapping, but also shown useful to develop successful flow-up system for the mobile community like truckers.

Items	Statistics
Estimated trucks on road	40,000
Projected number of truckers (drivers and helpers)	130,000
Projected number of truck drivers	80,000
Projected number of long-distance truck drivers	24,000
No. of truck stands in the country	130
Seasonal variation in trips between peak and dull seasons	25 %
Predominant age of the study samples	30-59 years
Marital status and religion of the study samples (of most cases)	Married and Muslim
Respondents' trucking experience (of most cases)	Between 10-20 years
Education level of the study samples (of most cases)	Class V-X standard
Income level of the study samples (of most cases)	TK. 5,000-15,000
Sexually active respondents	Apparently 100%
Respondents having multiple sex partners last three months	69.58 %
Safer sex practice (using condom in each contact)	Apparently none
No. of brothel-based CSWs in the country	40,000
No. of active brothels in the country	19
No. linked-up institutional sex-spaces in the country	14
Total sexual links between all sex-spaces during last 3 months	1180
Total sexual links between all hidden sex-spaces last 3 months	260
Total sexual links between all institutional sex-spaces last 3 months	(1180-414) = 766
Total sexual links between all institutional and hidden sex-spaces	(414-260) = 154
Average links between all sex-spaces during last three months	(1180÷ 15 = 78.67
Lifetime prevalence of STD among the respondents	63%
Prevalence of STD during the last three months	7.92%
Incidence of STD during last three months rate	11.38%
STD suspected to be originated in the institutional sex-spaces	48.24%
STD suspected to be originated in the hidden sex-spaces	51.76%
Suggested level of hierarchic interventions for truckers	3 level of intervention

Chapter 1

INTRODUCTION



1.1 Introduction

The issue of STD/AIDS has recently been emerging as one of the most attractive field of studies, especially in the beginning of the 1990s. Researchers around the world focus the issue from their respective angle. But yet nothing has been done from geographical point of view. The present research is an endeavour to fill the gap. This chapter is, however, introductory in nature and explains the problems in details, its relation with geographical value as well as practical needs; details of research design and its philosophical perspectives, scope and limitations of the study.

1.2 The Problem: Justification and Relevance

Acquired Immune Deficiency Syndrome (AIDS) has by now become a global phenomenon. The virus, Human Immuno-deficiency Virus (HIV), has been able to pierce essentially every single border. The piercing is invisible, especially in view of the number of travellers and migrant workers (Khan, 1996). According to the reports from World Health Organisation, over 22 million people world-wide are HIV positive, of them 4 million are estimated to be living with AIDS (WHO, 1995). This number is increasing every day by 6,000 with AIDS and 16,000 with HIV infection, even a conservative estimation shows that 40 million of world population will be infected by the turn of the century (Choudhury, 1998; Khan, 1996, WHO 1991a). Evidently, It has already been emerged as the most vulnerable crux for whole mankind, though the epidemic has not yet been breaking out on a virulent scale in many parts of the world like Bangladesh. Nevertheless, threatening of AIDS remains unchanged in these parts. Therefore, the phrase 'vulnerable to AIDS' is becoming a public issue, which commonly refers to several high-risk behaviors (WHO, 1991c). One of such causal agents is the heterosexuality prevailing in particular community, by which AIDS, and other STDs, even many infectious, and communicable diseases may be diffused within the whole

society, especially in a conservative society like Bangladesh (National Policy on HIV/AIDS and STD related Issues, 1996).

Sexuality is one of the basic instincts of all the living-beings and also of the mankind as well. Basic instincts refer to those behaviors or attitudes that come from or produced in automatically or intrusively through the organic mechanism or can literally be describe as an inborn tendency for an organism to react in certain ways without thought to specific stimuli (Nardo, 1991). Any coercion or delinquency to meet these intrusive yells may create from typical afflictions to profound psychological disorders (Freud 1856-1939; Millon, 1981, Sebastian, 1991). However, in every society there are customary practices as well as controls over sexuality. These customs mostly inhibiting or restrictive *i.e.* some degree of social taboos and controls over absolute freedom of sex are common in most societies, especially so to say that quite uncompromising in a conservative and orthodox society like Bangladesh. Most seemingly this is why sexing beyond the socially prescribed way is an old phenomenon.

Space is the basic organising concept of the geographer (Whittlesey, 1954). And spatial relations are the ones that matter in geography and no others (Schaefer, 1953). The famous British geographers Haggett (1990) used the word 'mirror' to make a sense of knowing process. He argued that if the historian uses mirrors to look back and the physicist uses mirrors to look forward, then the geographer's use of the mirror analogy lies in a different dimension_ that of space (Haggett, 1990). Every human activity has it's own spatial identity or in other words for any act of human beings, space is a basic requirement and hence the man-made landscape is being created over the space. Habermas (1984) in his famous philosophical memoir, 'The theory of Communicative Action' shows that places, community and senses of places are integrated. The communicative effort of a community necessarily occurs on 'some place'. In the same manner, sexing beyond the socially permitted way has found to be

organised on the particular space, which could be termed as sex-space and also queer landscape is being created on this space *e.g.* brothels that yet to be recognised and totally ignored by the geographers. Most likely the ignorance is due to timidity to the topic or may be from the thought of less important thing needs to be scientifically studied. But the time breeds the new cognisance to pay grievous attention towards sexuality from all point of views let along geographers' and this is crucially needed for saving the spices of *Homo Sapiens Sapiens* from an unprecedented global catastrophe of AIDS that seldom termed as 'Global Zero Hour'.

The epidemic of AID has globally been come into consideration since 1980s. It is also termed as the final the STD (Sexually Transmitted Diseases) (Check, 1988). Known STDs are now considered to be the 'gate way' to AIDS and hence all other known STDs (syphilis, gonorrhoea *etc.*) are getting increasing attention along with AIDS (WHO, 1990). Similar to any STD it spreads through sexual intercourse. On the other hand no successful treatment or even vaccination system for AIDS yet to be formulated and therefore prevention is the only way to escape one's from the danger of AIDS. However, although the other common STDs have successful treatment, yet it is the general consensus among the public health experts that prevention is the 'best medicine' for case of STDs. The question of prevention of STD/AIDS mostly underlines the factors of sexual behaviors and other aliened practices *etc.* (WHO. 1991a). As a result the phenomenon of human sexuality has come into the limelight. From the epidemiological point of view, the prevention of STD/AIDS and control of sexuality is meaning the same (WHO, 1991c). But the control of sexuality is a complicated and comprehensive affair to deal with. Because it is related with various factors such as socio-economic system, political commitment and government policy, culture, religious values, behaviors *etc.* of the particular community. Even the geographical and environmental characteristics of the different areas have profound influence on

preventive interventions. Thus multidisciplinary approaches or point of views as well as multi-sectoral actions are needed for successful prevention of STD/AIDS (National Policy on HIV/AIDS and STD related Issues, 1996 p.68).

Experts from various disciplines other than medical sciences *viz.* public health personnel, epidemiologists, social and behavioural scientists, anthropologists, communication and media experts *etc.* have come ahead to meet the challenge of STD/AIDS prevention and control. While, unfortunately, no role yet to be played from geographers' corner. But the scope of geographers in this field is wider than many disciplines. The traditional approaches, tools and techniques in geography such as spatial analysis, studies of landscape or diffusion process, temporal trend analysis, GIS and mapping techniques and interpretation, environmental and ecological view *etc.* can provide new avenues to have a different look and understanding of STD/AIDS and its prevention. In geography, there is a well-established branch called 'Medical Geography' dealing human health and diseases from different geographical point of views. Even in epidemiological research geographical comparison is an established tool for descriptive purpose. Thus use of geographers' view in medical and health related research is not at all a new element and such a way geographers should have active role in prevention of STD/AIDS.

However, one may raise the question as to how the geographers can play role in the field, especially in designing the preventive measures for STD/AIDS. In answering the question, it is needed to note here that unlike many other diseases STD/AIDS are more relevant to be studied geographically. The contagious nature of STD/AIDS is directly related to geographic analysis *e.g.* diffusion process, direction, spatial pattern, temporal trend, and underlining ecological or environmental factors of spreading STD/AIDS. While in case of prevention, spatial aspects of sexuality_ the key mode to spread of STD, are important to know, which includes: nature and distribution

of sex-spaces, spatiality of sexual linkages (*i.e.* between brothels through visitors/sex customers) *etc.* These sort of spatial information and analysis is important in determining effective locations for preventive intervention and for planning spatial order or hierarchy, which may be termed geographically as 'Spatial Planning'. With this typical planning, systematic spatial organisation, *e.g.* cost-effective and appropriate location arrangement and spatial hierarchy of preventive interventions could have been achieved, which undoubtedly saves cost, program overlapping and hopefully ensures integration between the different locations. This typical intervention in turn may also be useful in developing follow-up mechanism especially for those programs designed for mobile community like truckers.

In recent years AIDS has turned aggressively towards Asia and eight-fold increase in the number of infected cases over the past few years. For the region of SAARC, though it is assumed that conservative society and high family values might be the barrier in case of spreading HIV/AIDS in the region. Especially it is generally believed that the incidence of risk behaviors like heterosexuality and homosexual sex is not sharpened in Bangladesh. But the fact remains that risk behaviors are not non-existent, though not publicly open. Some of the recent newspaper reporting underlines this truth. A national daily showed that police arrested a young man from Mathertak, Dhaka, accusing homosexuality (The Daily Janakantha, 23 May 1998, p. 12).[1] In the same month and just after seven days the same daily reported another incident that a 60 years + guy was arrested for forcedly rapping a boy (The Daily Janakantha, 30 May 1998).[2] In an another news reported that as many as 32 so-called guest houses, night clubs, disco clubs and other societies were recorded in the high class residential areas of Banani, Baridhara, Gulshan, Uttara in Dhaka City. Though these clubs have been cultivated for the riches, but in practices middle class boys and girls are seen here engaged as party-boy and party-girls. (The Daily Janakantha, 21

December 1998).[3] These three sorts of news undoubtedly italicize the situation in Bangladesh. While on the contrary, alarming news is that according to WHO's estimation, countries surrounding Bangladesh *e.g.* Thailand, Myanmar, and India have already been seriously infected of which India is fast becoming the worst area in Asia, where currently 8-10 million people are HIV infected (Khan, 1996; Choudhury, 1998). The sprawling sex industries in Thailand and India are also indicating threat to the neighboring countries. Apparently Bangladesh is not so far from the AIDS affected tract. The epidemic has already started here though fortunately the country is still a low prevalence area. In Bangladesh, up to the date so far 105 individual reported to have HIV positive and the cumulative number of AIDS cases now stands at 10, of them 8 passes away (Discussion with Professor Nazrul Islam, BSMMU, 1998). While a projection of World Bank shows that AIDS cases in Bangladesh will cross the number of 147,000-703,000 by the turn of this century (WHO, 1995). But there was no HIV case in Bangladesh until 1988 (Choudhury *et al.* 1989). However, how many HIV carriers or how many AIDS patients have been detected in the country is not the matter as the virus is already here and number of HIV cases is increasing. In the view of the threatening of the epidemic of AIDS in Bangladesh, several measures for prevention and control of AIDS along with STDs have already been launched from both GO and NGOs end. Government has already formulated National Policy on HIV/AIDS and STDs related issues. And also taken several programs along with other international agencies. A good volume of KABP typed studies regarding HIV/AIDS/STD has already been conducted by the local and national NGOs *e.g.* HASAB, CEDAR, ASD, Paricharja, JSS *etc.*, and researchers working in international organizations in Bangladesh *viz.* ICDDR, B, CARE, Bangladesh, Action-Aid, Bangladesh, CCDB, *etc.* And also some sero-servailences have done especially by Medical collages. All these research works are largely

directed to determine preventive measures of AIDS/STDs in Bangladesh. For developing an effective prevention method continuous and multidisciplinary research is needed. In the national policy on HIV/AIDS/STD stated the need for multi-sectoral researches and actions (National Policy on HIV/AIDS and STD related Issues, 1996). Experts from different disciplines except geographers in Bangladesh have already pledged them in facing the challenge to humanity.

However, almost all the studies done in Bangladesh, have identified the same population sub-groups as highly vulnerable to HIV/AIDS/STDs such as CSWs, IVDUs, seafarers, slum dwellers, migrant workers, different transport workers *e.g.* rickshaw-pullers, truckers *etc. (vid.* Chapter 3). Truckers are included both in the group of transport workers and in mobile population sub-group (National Policy on HIV/AIDS and STD related Issues, 1996). While in the global context, these population sub-groups are categorised the same (WHO, 1991a). Sometimes these groups are called 'High Risk Group' or epidemiologically termed as 'Core Group' (Thomas and Tucker, 1996). Among these sub-groups truckers are huge in numbers; they are the only group whose have access to each corner of the country. Finally, several studies also found to have unsafe sexual behaviors and practices among the truckers (Archo, 1993; CEDAR, 1995; Khan, 1996). Moreover, they are rather closer connected to the general people and have bridging role between general people and the CSWs, since they purchase sex. Moses and his associates (1994) found in Africa that people who purchase sex, play a bridging role between commercial sex workers (CSWs) and the general women population (Moses *et al.*, 1994). Then it would not be unrealistic to forecast that truckers are only vulnerable to HIV/AIDS, but through the group HIV/AIDS can also be spread among the general people as the way, as they are transporting goods over the country.

It is encouraging to notice that several NGOs with the support both from international donor agencies as well as government allocations have targeted trucker

community and started preventive interventions. These typed of interventions are new phenomena in Bangladesh and most are not design on the basis of comprehensive researches from multidimensional outlook, rather so to say, that simply on so-called need assessment or sometimes termed as KAP (or KABP) survey. Even a few NGOs did this so and the government funded NGOs did nothing at all. Indeed no academic research focussing solely the trucker community has found to be conducted not only in the case of Bangladesh, but no where in the world (*vid.* Chapter 2: literature reviewing). The present researcher has consulted several national and globally recognised retrieval services (*e.g.* National Retrieval System, developed by Bangladesh Medical Research Council and Medline, Popline *etc.*). But no research has exclusively done from the spatial point of view. The mobility pattern of the truckers community, their sex-spaces (*i.e.* where they used to do sexes other than wife or wives), its' geographical locations and spatial pattern, linkage between the sex-spaces, location of the origin of STDs and its diffusion process, spatiometric risk networking among the truckers, locations vulnerable to STD/AIDS, *etc.* are absolutely geographical aspects of sexuality and STDs/AIDS and need to know for developing an effective prevention interventions. Even due to lack of systematic geographical research no spatially integrated or hierarchical arrangement of STD/AIDS interventions have yet been organised.

However, recently CARE, Bangladesh, an international NGO working with CSWs of Bangladesh, under the auspices of BAPC/UNAIDS had organised national consensus workshop at Dhaka to develop a countrywide targeted intervention networks for the prevention of AIDS/STDs among the CSWs (GOB, 1997). The present researcher himself was an active attendant there. The workshop emphasised the need for same networks or in other words spatial planning for systemising countrywide intervention programs for other vulnerable communities or core groups. It is, however, speculated that this typed of spatial pattern of intervention would be helpful in

developing follow-up or fed-back system for the mobile population like truckers. All the above potentials are directly related to geographical point of views, though yet nothing to be launched from geographers' end. The present research is however an attempt to meet the crying need.

1.3 The Research Questions

Drawing on the above discussion it seems appropriate to put forward some questions from geographical point of view, and which are important to know for effective STD/AIDS interventions. These are as follows.

I. What are specific locations from where STDs may have been originated or diffused throughout the country *i.e.* the 'origin-node' (active origin);

II. How and why a location becomes vulnerable to STD/AIDS or in other words what are the locational dynamics and environmental characteristics (determinants) that make the locations vulnerable; and what are these locations (passive or potential origin).

III. What might be the spatial process of STD/AIDS diffusion *i.e.* in which routes STD/AIDS may have transported over the country through trucker community?

IV. Is there any spatial behavior (*i.e.* mobility behavior) other than so-called socio-economic characteristics or high-risk behaviors (background characteristics of the respondents) that make a person or a group at risk?

V. How a 'follow-up system' can be introduced and incorporated with the STD/AIDS interventions for truckers?

The **first question** is borrowed from the assumption that sexuality is the key mode of transmission of STD/AIDS (*vid.* Chapter 2). This assumption judgmentally converted into spatial frame and named as sex-spaces_ are the points where STDs may have been originated. Therefore, identifying and mapping of these spaces are

considered to be the prime focus of the present study. The **second question** is also the spatial manifest of the assumption that people inspirits to have sex under certain conditions or environment and thus the places belonging this typical situation become vulnerable and that are needed to identify, map and analyze. This question will ultimately uncover the locational dynamics and environmental factors of STD/AIDS. The **third question** is the most important one that covers spatial diffusion process of STD/AIDS. In search of the question a new concept termed as 'spatiometric risk networks' has been introduced (*vid.* Chapter 3). **Question 4** is an another endeavor to understand the background characteristics of respondents that are of geography seasoning. It is needed to note here that epidemiologist and other medical sociologists are seen to be commonly rested on socio-economic characteristics or high risk behaviors for the background characteristics of the respondents or these characteristics are taken as independent variables in the cross-sectional studies on STD/AIDS. But the present research looked for new dimension in selecting background variables *e.g.* mobility behaviors that indeed from geographical chore. The **final question** is related to the present day's crying needs in the prevention of STD/AIDS for the mobile community like truckers. In answering the question need of spatial policy implications has been suggested.

These questions, however, have been translated into the several tasks or objects of the present study.

1.4 Objective of the Research

The study is designed to understand the spatio-temporal aspects or dimensions of sexuality and consequently STDs along with the risk for HIV/AIDS among the truckers community in Bangladesh with regards to their usual livelihood *i.e* socio-economic and demographic characteristics, life style, sex behaviors, practices,

knowledge, beliefs, values, as well as mobility behaviors *etc.* The study subsequently proceeds on towards critical analyses, prediction, and simulation of locational vulnerability to STD/AIDS through trucker community. However, the specific objects are as follows.

1.4.1 Specific Objectives

- To understand the socio-economic and demographic characteristic of the long-distance drivers community in Bangladesh;
- To understand KAPB or High Risk Behaviors of the same;
- To understand the mobility behaviors of the community;
- To understand the nature and spatio-temporal pattern and region of sex-space, and its spatial form of risk networks, risk regionalization, spatial order and hierarchy, potential diffusion paths *etc.* that together make certain locations vulnerable to STD/AIDS for truckers;
- To understand the spatio-temporal aspects of prevalence, incidence and pattern of STDs pattern among the said population;
- To understand the geographical determinants including locational, ecological or environment along with others factors in a particular location that enhance sexuality and consequently STDs in that location;
- To suggest the spatial policy implications to STD intervention so that an effective and cost- minimising monitoring and follow-up system can be developed especially for truckers.

These objectives are indubitably spatial oriented, which also in other words, of geographical edified. On the other hand, the questions are much more tendered to practical or intervention needs than of problematic or academic nature of

investigation. Thus health policy makers should keep these in mind and geographers' role invariably needs to be embodied with STD/AIDS prevention and control policy. However, for several reasons the above issues were not ease to attend with conventional methods of study. Therefore, a philosophical reviewing was done to have a methodological basis for meeting the above objects.

1.5 Philosophical Perspective: Searching Methodological Basis

The evaluation of existing literature suggested that much have been written on the phenomenon of human sexuality and STD/AIDS of different communities from different sociological and epidemiological point of views. But almost nothing done on trucker community and nothing at all from spatial or geographical point of view. On the other hand, it should be better to note here that the very inspiration for conducting the present research was to meet the practical need of present-day's crisis of AIDS/STD, even, though, this production inevitably a partial fulfilment of an academic degree. Under the scenario, the question is that how should one go through for the need of any scientific investigation on the mentioned issues of the said community so that it must be able to meet academic procedure and the practical needs as well. In fact what type of logic to be used or exactly where in some sorts of model or analytical-conceptual framework or methodology be a particular part of an investigation belongs is a critical question. This is not particular to geographic discipline, but also similar problems are faced by the logicians themselves (Olsson, 1967).

The practical approaches of a research *i.e.* action research is said to be rather loose, informal, relaxed, qualitative, participatory, inductive, need basis, but in detailed, penetrative and reflexive of the reality, in contrast to academic research that seems to be as rigid, quantitative, hypothetical, *a priori*, theoretical, model based. Nowadays emergence of NGOs as an important development partner and practical knowledge

generator, and their campaigning for practical and qualitative research instead of theoretical or academic nature kicks to some extent a critical challenge to academicians. On the contrary, university oriented academicians rarely admits the practical research and frequently raise the question on the methodological or epistemological structures of those of informal NGOs' approaches (one of such instances can be reported here. Just a years ago the sixth annual conference of ICCDR, B namely ASCON was held in Dhaka in 1997. The conference theme was RTI/STD. The present researcher was an attendant from an NGO. The ICDDR, B and their activities are seemingly an ideal example of interaction of NGO and academic approach, which had been reflected in the conference. Both the academicians and the researchers or activists from NGOs presented their papers in the conference. Interestingly it was noticed in the discussion sessions that the participants from academic grounds freely criticised the qualitative approaches of some papers from NGO ground. Even they raised question regarding the scientific value of those of NGO presented in the conference. A detailed debate of such paradigmatic shift is well presented in several works' of renowned PRA/RRA specialist Robert Chambers, 1992). Besides there are other distinctions such as: Qualitative vs. Quantitative, subjective vs. objective, inductive vs. deductive, descriptive ideographic vs. analytical inferential or nomothetic *etc.* The dilemma, in turn, derived from the philosophical debate of the early empiricist-positivist with the recent behaviourist-humanist logicians. And the debate, along with the other social sciences, shapes the epistemological structure of geography. A little bit touch on this debate seems to be relevant in this argumentation.

Jurgen Habermas critical theory (1978: 308) suggested that there are three categories of processes for which a specific connection between logical-methodological rules and knowledge-constitutive interest can be demonstrated. These are: the approach of the empirical-analytical sciences incorporate a 'technical' cognitive interest;

the historical-hermeneutic sciences incorporate a 'practical' one; and the approach of critically oriented sciences incorporate the 'emancipation' (Habermas, 1978:308). The empirical-analytical science, in other words Positivism, or Positive Philosophy, was developed during 19th century in the writings of Auguste Comte (1798-1957), most notably in his 'Cours de Philosophie Positive' (Unwin, 1992). He argued that social phenomena are subject to law and method of enquiry, which is directly parallel to those of natural sciences. In methodological terms, Comte idea was based upon five central rules, and used the term positive in all of these cases. He used positive to refer to 'actual' rather than the imaginary, the 'certain' instead of the undecided, the 'exact' in contrast to the imprecise, the 'useful' rather than the vain, and the 'relative' in contrast to the absolute. Finally, Comte emphasised that this methodology, involving observation, experiment and comparison was relative and unfinished (Gregory, 1978). With the influence of Comte idea, by the 20th century members of 'Vienna Circle' developed a modified version of positivism known as logical positivism. The clearest expression of the methodological implications of this philosophy for the factual sciences is that the scientific explanation of past events and prediction of future one can be achieved from a set of determining conditions and a set of universal hypotheses or general laws (Unwin, 1992). Positivist science is fundamentally furnished to the production of technically useful knowledge, and is concerned with the prediction and control of processes that have been objectified (Roderick, 1986). In the tradition of logical positivism, emphasis usually is placed on the dualism between theoretical and empirical knowledge and on the systematic co-ordination of theoretical and empirical procedures in scientific activity. This is usually termed as hypothetico-deductive systems in which some of the axioms and theorems are interpreted empirically by the means of correspondence rules of positivist view (Olsson, 1968).

The second type of philosophy that Habermas (1978) termed as historic-hermeneutic science had developed into a powerful alternative to the empirical-analytical science of positivism. Whereas positivist social science sought 'explanation', hermeneutics sought 'understanding' (Bauman, 1978). The hermeneutic science draws attention to the experience of the internal reality, rather than simply the external objectivization of logical positivism (Habermas, 1978: 143). While the Husserl's hermeneutics known as 'phenomenology' seeks precisely to disclose the world as it shows itself before scientific enquiry, as that which is pre-given and presupposed by the sciences. It seeks to disclose the original way of being prior to its objectification by the empirical sciences (Pickles, 1985). However, the basic propositions of phenomenology are that of experiences oriented philosophical enquiry; but no absolute criterion of precision exist, rather it is a function of both subject matter and context. Hence one does not necessarily have to determine a term precisely before starting the analysis of both it and the corresponding experience; and the philosophy should be concerned with the search for the absolutely presuppositionless (Mercer and Powell, 1972). These propositions have profound methodological implications.

Drawing the above philosophical perspective it seems appropriate to recall and consider the scenario of the present research that touched a little bit earlier in this section. However, in addition to this, there were other questions, *e.g.* as to how it is possible to developed hypotheses for inferential purpose; similarly, how it is possible to construct questionnaire for empirical investigation without having some extend of knowledge about the issues to be researched. Once again note that almost nothing on the research topic found in the existing literature. There are also other things, such as to the question of quantitative database of sexuality and STDs which is almost impossible to obtain from direct question especially in conservative society like Bangladesh, but this basis is a requirement for inferential studies. All these

questions arise to meet the goal and objectives of the present research and these are virtually conflictive in nature.

Given the above dilemma, it seems wise to adopt the suggestions of Chorley (1964) that of using inter-looking system. Similarly Olsson (1967) argued for a more flexible approach where the concepts of induction, deduction, theories, hypotheses, and models all have been intermingled. In this regard scientific work may be viewed as an iterative procedure in which distinction between *a priori* and empirical tends to disappear; the clear-cut notion from philosophy become blurred (Olsson, 1967). Thus the very need of the present research press to use philosophies accordingly rather to follow strictly. This is done to established a systematic co-ordination between inductive vs. deductive, qualitative vs. quantitative, empirical-analytical vs. hermeneutic understanding, and also between the academic endeavors and the practical need, or in Habermas' (1978) words, to developed an understanding of connections between knowledge and action, which indeed, the central concerns of 'critical science', the third and final category of philosophy. The present research, however, follows the same philosophical way of learning and operationalizes the philosophy into the methodological basis, which has been summarized in the (Figure 1.1). The figure shows the possibility to transformed the philosophy of inter-looking system or termed as flexible approach where the concepts of induction, deduction, theories, hypotheses, and models *etc._* all have been intermingled; and also shows how a systematic co-ordination can be developed between inductive vs. deductive, qualitative vs. quantitative, and between the academic vs. practical research. Finally, for specific example of the application of this methodological structure and its underling philosophy, however, has been illustrated in the forthcoming section of research design of the present thesis (*vid.* Figure 1.5).

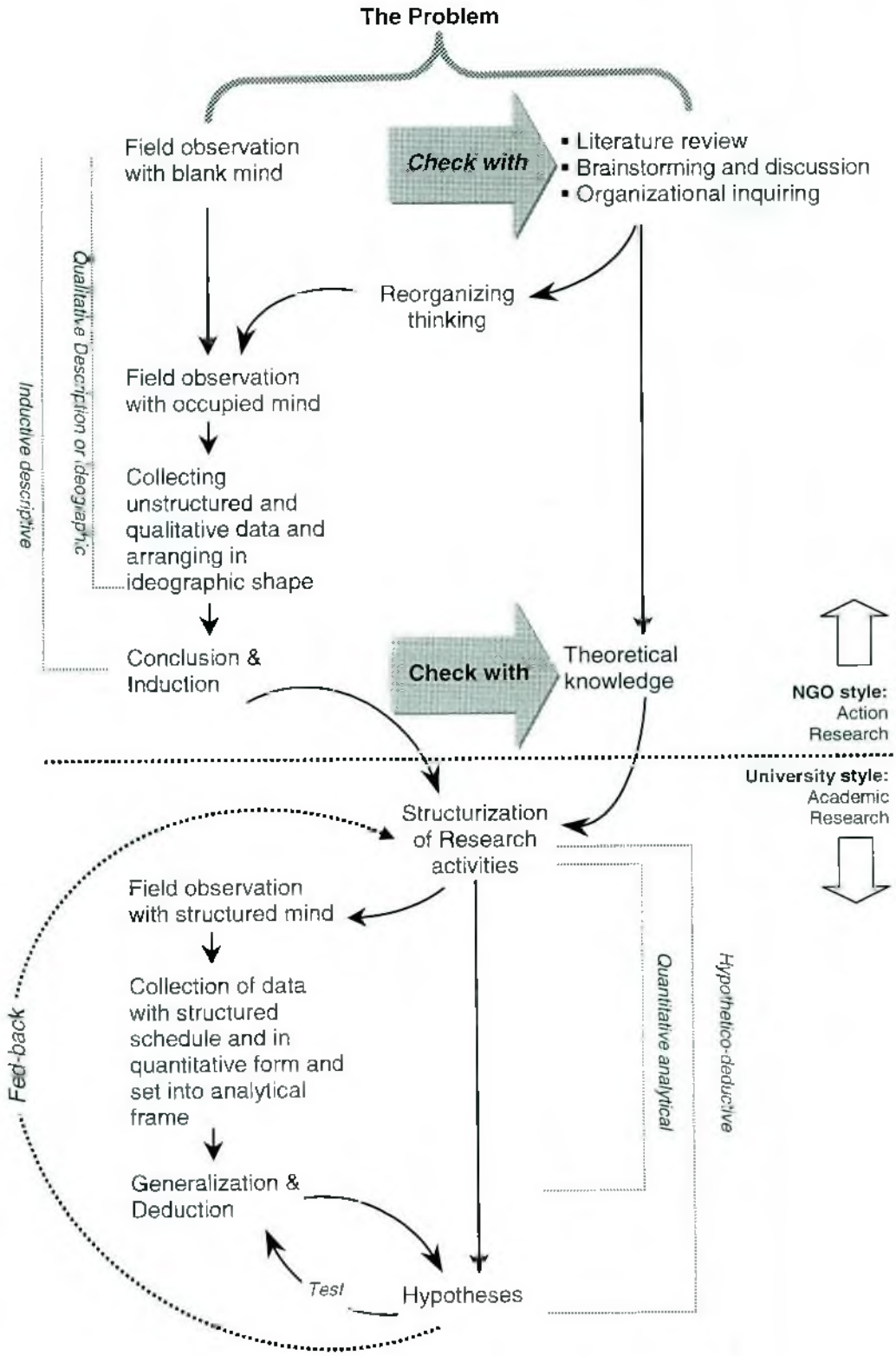


Figure 1.1 *The methodological basis of the present research, derived from the philosophy of inter-looking system in which a systematic co-ordination has been done between inductive vs. deductive, qualitative vs. quantitative, and between the academic vs. practical*

1.6 Research Design

1.6.1 Reconnaissance: Organisational and Qualitative Survey

The present researcher has been working in the line of STD/AIDS prevention since 1995. He is one of the pioneers in this field in Bangladesh. He had participated in several training workshops and seminars on STD/AIDS research, planning and development organised by different national and international agencies. These education and experiences in fact persuade him in choosing the present topic and help variously in developing the research design. Moreover, extensive and intensive field visits were done as reconnaissance. Several truck stands, terminals and union office, owner association, concern governmental offices such as BRTA, IWTA, Bangladesh Customs, concerned NGOs were visited and made discussion with the due personnel (a list of the concern personnel is given in the appendix 5).

A journey along the highways of Dhaka-Aricha-Benapole and Dhaka-Aricha-Hili was made with a known truck driver. The researcher was just beside the driver. This was done in an intention to have experience with participatory observation of truckers' way of life on the highway and happenings in the trucking line, which in turn enthused in developing formal questionnaire and study design. An informal report of this qualitative study was also produce and several notes and quotations of its were adjusted in different chapters and sections of the formal report.

1.6.2 Retrieval of Secondary Sources and Reviewing

A good volume of studies covering clinical, laboratory-based experimental, epidemiological, sociological, behavioral, legal, political, and policy oriented, even covering philosophical, religious, and ethical aspects and issues have been done up to the date and published in several internationally accepted research journals and other recognized sources. These works were complied and circulated in the form of

CD-ROM by the different retrieval service providers. The present researcher took this most-modern opportunity and consulted some of the internationally renowned retrieval services, such as 'Med-line', 'Pop-line', as well as 'National Retrieval System' developed and operated by Bangladesh Medical Research Council (BMRC). It is hoped that these excellent sources are well enough for covering STD/AIDS related works around the world. The articles that have been available on these sources since the 1990s were consulted and except the highly clinical or experimental or pure bio-medical ones, all other relevant or quasi-relevant articles including socio-behavioral, epidemiological, interventions related or action researches are considered for reviewing and analyzing. While, other available sources including seminar proceedings, monographs, reports, statistics, books and unpublished materials were also handled. Finally, it is needed to mention here that no material had found to be directly related to the present research. However, though a very few works found to have a little bit touch on geographical aspects, but in true sense, no research have yet seen to be conducted around the world let along Bangladesh exclusively on the measures of STD/HIV/AIDS prevention and control from the spatial point of view.

1.6.3 **Discussion with Professionals**

Finally, before starting the formal research intellectual exchange, brainstorming were performed with well-known experts in the field of STD/AIDS as well as population and migration. These sessions were so interesting and worthwhile. The involuntary counsels of different scholars succoured the present researcher variously in solving the methodological quest and shaping the present from of methodology of the present research (a list of professionals is given in the appendix 3).

1.6.4 Sampling Procedure

1.6.4.1 Study Area and Truckers' Universe

The study conducted on the long-distance truck drivers' community in Bangladesh. Thus the ultimate study area should be the whole country and the entire community as the universe. An organizational survey was initiated with an unscheduled checklist to know about the nature of the universe. It was apparent that truckers usually concentrate in some specific locations that generally known as 'Truck Stand'. There are about 130 such stands were counted in the survey. These stands are different in nature and size. Trucker starts from a stand and ends at such of another one. Thus they are confined with these spaces in their professional life. This is the spatial identity of the truckers' universe. Within this totality some characterizing features were also uncovered (*vid.* Chapter 3 and 4). **First**, trucker moves form some major origins may be termed as 'Base-points' or may be labeled as "Truckers' Base" and at least 6 of such origins were identified *viz.* Dhaka, Chittagong, Khulna, Rajshahi, Bogra, Rangpur *etc.* In fact truck owners are living here and thence trucks are registered here and these locations are the ultimate destinations of the concerned trucks. **Second**, trucks are move in some major directions or routes. A total, of 6 nationally important Dhaka-based routes was identified in the survey. These are Dhaka-Chittagong, Dhaka-North Bangle, Dhaka-South, Dhaka-Sylhet, Dhaka-Rajshahi, and Dhaka-Mymensingh.

As to population universe, a projection was made in which estimated a total of 80,000 truck drivers and 50,000 Helpers against 40,000 trucks on road. This is the other identity of the truckers' universe.

However, covering the whole universe under study is conspicuously impossible for the reason that of scheduled time limit and for the resource constrains as well. Even not pleasing from the methodical point of view. Truckers were found to

be rather homogeneous in socio-economic and behavioral perspectives as well as the massing of truckers (*i.e.* truck stand) were also seen somewhat evenly distributed over the country. Thus sample study should endurable in drawing any conclusion on truckers in Bangladesh.

1.6.4.2 **Selection of the Study Routes and Its Justifications**

As mentioned earlier that there are at least six nationally important major truck routes derived from Dhaka City and each should considered for drawing statistically meaningful samples. But some explanations were given in the next paragraph as to why it was difficult, even impossible in some cases, to conduct interviewing with the respondents in every route. In short, the very nature of the study impelled a great deal in designing methodology. One of such impulsion was the necessity of the presence of NGO interventions (STD clinic) for the truckers in certain route. This requirement was an important criterion in the selection process of study sites. Therefore, once again organizational survey on STD/AIDS concerned donor agencies and NGO Networks was undertaken for sorting the NGOs interventions in different truck routes. Under this assignment HASAB, NAC, VHSS and ActionAid, Bangladesh, were visited and their activities regarding the prevention of STD/AIDS among the trucker community in different routes were searched and evaluated in terms of locational properties. Accordingly two major truck routes namely Dhaka-Benapole and Dhaka-Hili were found to be suitable, and therefore this two were selected for further inquiring of specific sites (Figure 1.2).

1.6.4.3 **Selection of Study Sites and Its Justifications**

In the reconnaissance of all the potential locations along the selected routes *i.e.* Dhaka-Beanpole and Dhaka-Hili highways were identified and assessed in terms

of several selected criteria. The journey started from Tejgaon and end at Hili. The identified locations are shown in the Table 1.1. The assessment was made in terms of availability of truckers; whether the location is a staring or ending point, or stopover; locational vulnerability *i.e.* existing of sex workers or other environment quality that makes the truckers at risk and finally whether NGO interventions especially STD clinic is available or not. It was observed that truckers are interested in interviewing at the stopovers like Aricha, since they have time on hand but they are busy in loading or unloading purpose in both at starting and ending points. While the most important thing is that the issue of sexuality is seldom openly dealt in the traditional conservative society like Bangladesh. Questioning directly on such 'sensitive' issue at an open space may create public nuisance. Even though the truckers found to be rather bold but it becomes still difficult to approach the respondent without building *a priori* rapport with the community and sometimes difficulties were faced to have free responses without ensuring interpersonal atmosphere with a private place. Considering the complexities, places where NGO intervention exists and has a STD clinic were selected for research sites. Thus a total of four sites were selected and these locations are also shown in the Figure 1.2. Of the selected locations only Aricha scored the maximum score (Table 1.1). While Daulatdia fall into second highest group, but not considered for study because of the absence of NGO interventions and also of their overhanging location to Aricha. But instead of having equal score Tejgaon, Hili, and Benapole were selected because of their national and other locational importance and also of the presence of STD clinics. It is needed to note here that respective NGOs working in the chosen sites were also selected the same locations for intervention amongst truckers almost with regards to the same locational advantages.

Table 1.1 **Location Assessment for Selecting the Study Sites**

Routes	Potential Locations	Assessment Criteria				Total Points	Remarks
		A	B	C	D		
Dhaka to Benapole	Tejgaon	1	1	0	1	3	Selected
	Gabtoli	1	1	0	0	2	
	Aminbazar	1	0	0	0	1	
	Savar	0	0	0	0	0	
	Utholi	1	0	0	0	2	
	Aricha	1	1	0	1	3	Selected
	Dauiatdia	1	1	1	0	3	Critical location
	Faridpur	1	0	1	0	2	
	Magura	0	0	1	0	1	
	Jessore	1	0	1	0	2	
	Benapoie	1	1	0	1	3	Selected
Dhaka to Hili	Nagarbari	1	1	0	0	2	
	Sirajgonj	0	0	0	0	0	
	Bogra	1	1	0	0	2	
	Jaipurhat	0	0	0	0	0	
	Hili	1	1	0	1	3	Selected

Note: *The journey, Dhaka to Hili started from Nagarbari since the expedition unto Aricha had already been made.*

Scoring *: Yes = 1*
: No = 0

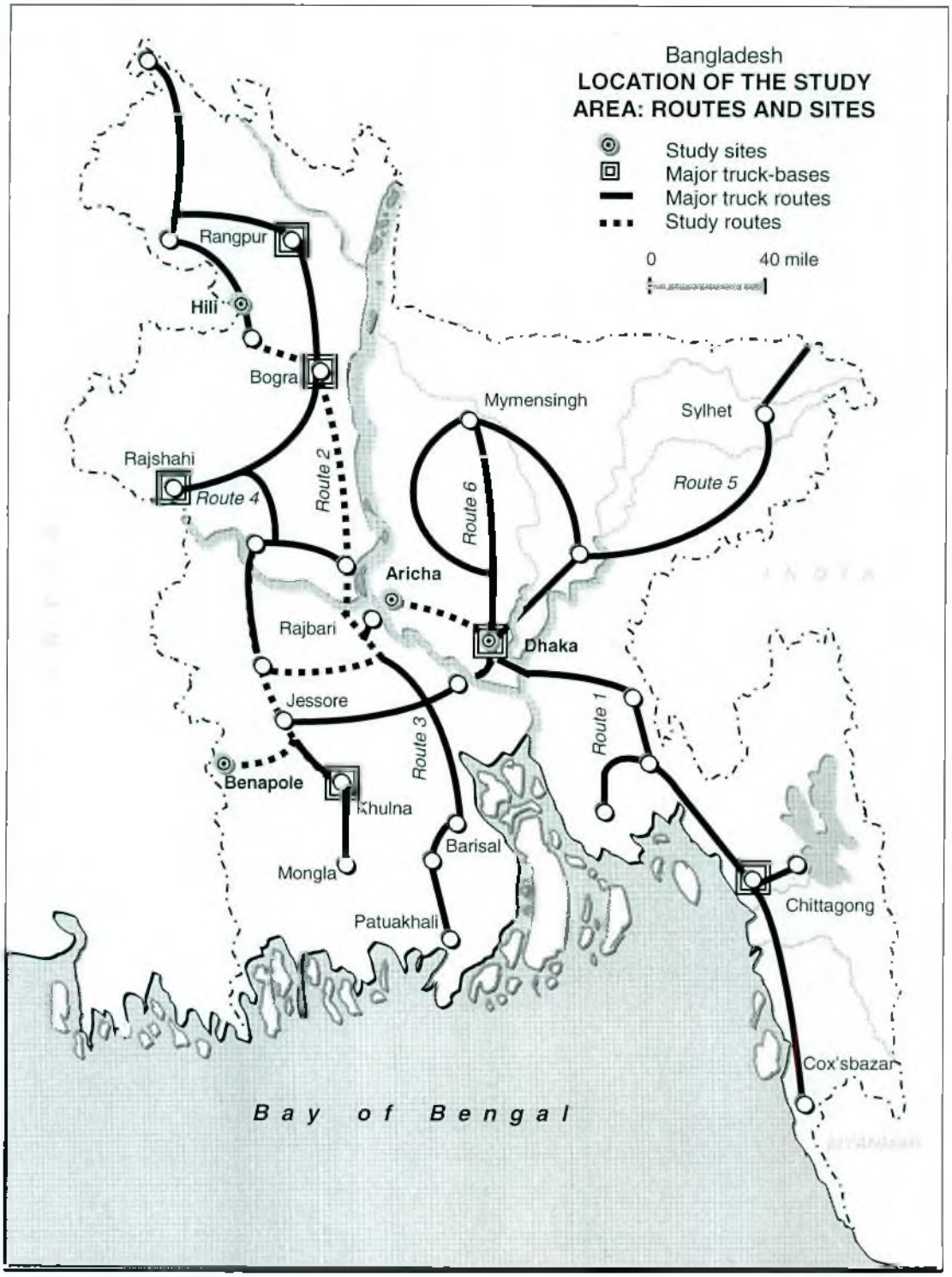
Assessment Criteria

A. availability of truckers i.e. presence of enough number of truckers at the site;

B. whether the location is a stopover; or closer to transit point/port/ghat or having some degree of national/regional importance in terms of volume of trucks or other socio-economic and geographical reasons;

C. existence of brothels or not (or other forms of sex networking e.g. floating/hotel based etc.) had also been seen);

D. Whether NGO intervention especially STD clinic for truckers is available in the location.



Source: *Field Survey, 1997*

Figure 1.2 *Figure shows the study routes and the selected sites on it. The map also shows the general picture of trucking space including truck-bases, major truck routes and stands in the country. The map was drawn with data collected during the field survey in 1997.*

1.6.4.4 Selection of Subject and its Justification

As noted earlier that almost all of the studies done in Bangladesh identified the some population sub-groups as the highly vulnerable to HIV/AIDS/STDs, of which truckers are placed on the top. This is also true in the global context. These groups are called 'High Risk Group' or epidemiologically termed as 'Core Groups'.

While researchers found to have important relations between AIDS/STDs and migration that make it vital field of research and development. In the Bangladesh government's policy document on HIV/AIDS and STDs related issues truckers are pigeonholed as extremely mobile group compare to others and highly vulnerable to STD/AIDS (GOB, 1996). Moreover, among other vulnerable population sub-groups, the truckers are huge in numbers; they are rather closer connected to the general people; they are only group that have access to each corner of the country; finally several studies found to have risky sexual behaviors and practices among the truckers. Hence it should not be unrealistic to forecast that this community is not only vulnerable to HIV/AIDS, but through the group, HIV/AIDS can also be outburst amongst the general people as like as they are transporting goods over the country.

It is encouraging to notice that several NGOs with the support both from international donor agencies as well as government allocations have targeted trucker community and started preventive interventions. Nevertheless, there is no academic research has found to be conducted not only in the case of Bangladesh, but no where in the world exclusively focussing the same community.

Finally, the present researcher has been employing in a pioneering intervention for same community for over three years and playing role in both research and program development at national and regional level. Drawing on the above rational the community called Truckers are targeted for the present research.

1.6.4.5 Subject Sampling and Sample Size

There are about 80,000 truck drivers and 50,000 helpers in Bangladesh (*vid.* Chapter 4). It is also estimated that 30 *per cent* of the total truck trips are inter-districting oriented. Thus it may be assumed that the same *per cent* of drivers engage in long-distance driving and thus the number of this drivers population should be around 24,000 (30% of the total of 80,000). However, in the study, the long-distance drivers were considered with the intention to avoid complexity and also from the assumption that the helpers are found to be nothing but the trainee truckers. Similarly, ordinary drivers are in the processing stage to be a matured driver in future like those presently in long-distance driving. Thus helpers and ordinary drivers are subtracted from the study population. Nevertheless, the estimated driver population was huge in number and in true sense, the actual figure is unknown. Then no way but following the samplings procedure.

But no sampling frame or procedure has found to be fitted in this case that allows true probability basis of sampling. Some typical form of street recruitment basis sampling operation was recommended in several epidemiological studies on unknown or 'hidden' population at high risk. This typical sampling is also non-probabilistic. From geographical point of view, 'Line Sampling' or 'Chunk Sampling' or 'Cluster sampling' frame are somewhat inspiring in site selection, since in the present study followed particular routes and certain chunks. But these tools have no use in selection of subject sample for the present study. Thus considering the critical situation and the huge and unknown population size, convenient but judgmental sampling was made, which almost similar to that of street recruitment. However, one important difference is that subjects were though recruited in the street and other outreaches were done but that was indispensably encompassing the STD clinics of the selected sites and most hearing of the respondents were conducted in

counseling sessions. Note that there is a provision of these STD clinics that whilst a clients come to visit these centers, they are requested to attend a counseling session on STD related issues. The visitors whether having STD or not were not taken into account rather whom had time on hand and interested to partake in an interviewing were subjectively welcomed. Thus case and control subjects were not judgmentally abstracted following *a priori* decision.

Table1.2 **Sample Allocation for Selected Sites**

Study Sites	Points Assigned	Sample weight	Selected Sample
Tejgaon	3	1=15*	45
Aricha	4+3=7	1=15*	105
Benapole	3	1=15*	45
Hili	3	1=15*	45
			Total sample subjects = 240

** 1 location point = 15 Subject samples*

As to the question of the sample size, no formal size determining assumption-based rigid statistical formula (*e.g.* $Z^2=pq/d^2$) was possible to applied, since the subjects were not a hard statistical probability sample of the population. Yet, subjective statistical weighting system was developed instead of absolute purposive sampling to determine the sample size (Table 1.2). Point distribution for each location has been assigned on the basis of location assessment as shown in the Table 1.1. For example, four study sites were selected on the basis of maximum assessment scoring in which Aricha scored 4 points, flowed by Tejgaon, Benapole, and Hill each with the score of 3 points. Though an another important location, Daulatdia, secured 3 points but not selected because of its closeness to Aricha. But the point of this location was coupled with Aricha and successively it becomes with 7 points (original 4 + additional 3 points). Thus a total of 240 subjects (15 samples for

each point multiplied by the total of 16 points) were sampled against the total of 16 points of which Aricha along belonged to 105 samples followed by Tejgaon, Benapole and Hili with 45 samples each. The subjects are not probability sample of the population. Yet, in few cases conventional statistical tests have often been used with the samples to provide an indicator of whether statistical associations are likely to be due to chance (Friedman *et al.*, 1995 and 1997).

1.6.4.6 **Sampling Procedure in Short**

A brief illustration of sampling procedure is given in the Table 1.3 and the Figure 1.3 below. Table shows that several phases of jobs by which sampling techniques and outcomes are tabulated. Similarly, Figure 1.3 portrays the same in different manner and also with computing facts. It is apparent that the sample subjects actually represent the inter-district (*i.e.* long-distance) drivers, but in turn they all belong to the characteristics of the whole trucker commonly and hence small sample size was considered. Finally, although the sampling was drawn through different stratification, but the procedure was merely judgmental and purposive.

Table 1.3 **Sampling Phases**

Phases	Job done	Tools/Source	Result
Phases 1	Identifying truckers' space	Qualitative and Organisation survey on truckers' Unions, BRTA, IWTA, Custom authority and concerned NGOs	130 stands
Phases 2	Identifying truck-bases		6 bases
Phases 3	Identifying major routes (Dhaka based)		6 routes
Phases 4	Truck-base selection		1 base
Phases 5	Route selection		2 routes
Phases 6	Sites selection	Location assessment	4 sites
Phases 7	Subjects selection	Purposive sampling	240 subjects

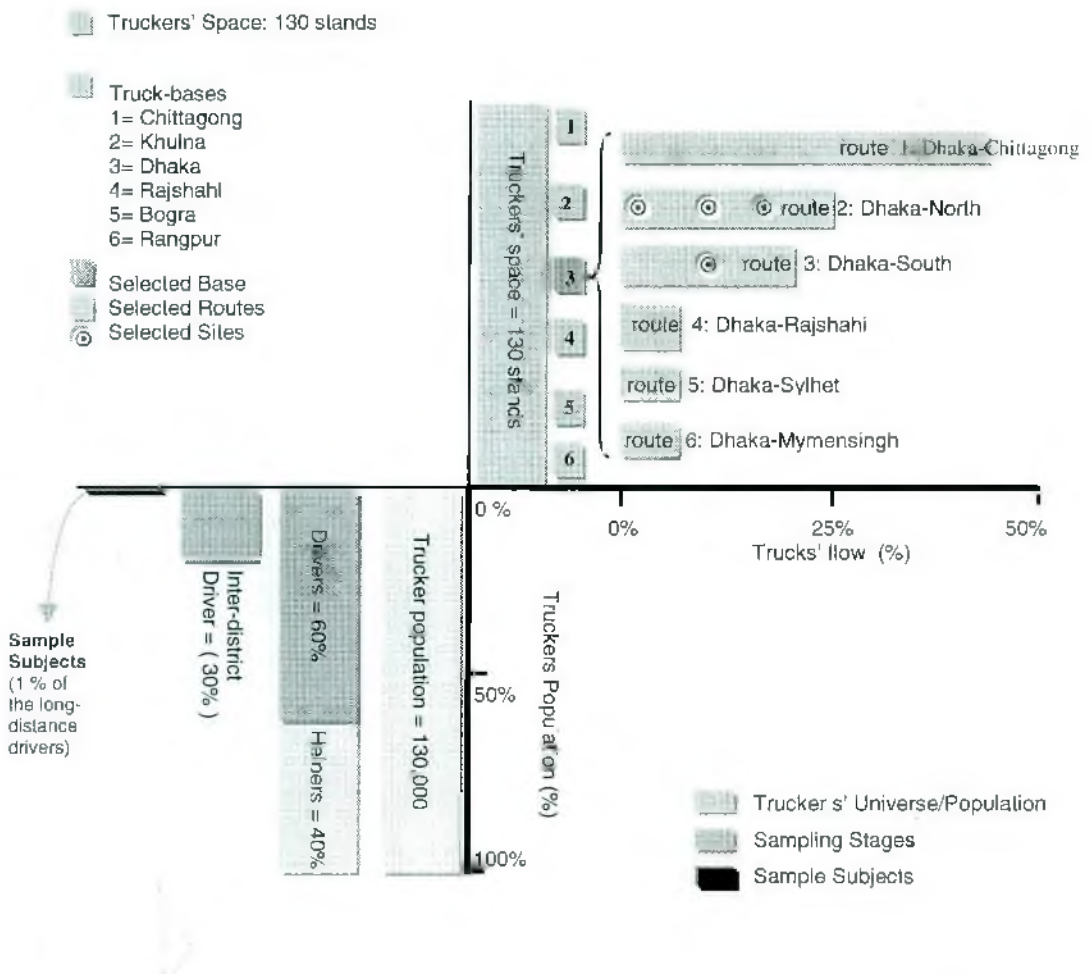


Figure 1. 3 *Selection procedure of truck-base, routes and study sites as well as subjects sampling. Figure summarizes the different phases of the whole sampling procedures. The upper right of the figure shows the sampling phases of sites from the truckers' space, while the lower left shows the subject sampling procedure. The sample subjects are different segments in context to the different stages of trucker population, viz. 0.18% of the total population; 0.3% of the driver population; and 1.00% of the long-distance driver population. Since the study by namely concerning with long-distance drivers, then the sample size (1.00% of this population) is not so far from the meaningful probabilistic statistical margin (generally, a sample size of 2.5% sample is an acceptable standard for representing large population), and consequently hope that the sample size may well represents the targeted universe under the limitations of time and resources.*

1.6.5 Development of Questionnaire and checklist

After completion the reconnaissance and other *a priory* studies such as relevant literature review, discussion with professionals, an anonymous unstructured and partly self-administered explanatory questionnaire was prepared. A good number of suggestions from the supervisor were also incorporated. A short pre-testing was then conducted and thereafter a formal questionnaire was finalized with required modifications. Similarly, a checklist was also developed for organizational survey. The questions were in Bengali and colloquial accents were used in interviewing sessions. Even some cases supplementary explanations with examples were embodied to void confusion as well as to institute worthy interaction between questioner and participants.

1.6.6 Rapid Assessment and Contextual Mapping

A rapid assessment on the local environs and other locational characteristics of the study sites were undertaken and as the same time contextual mapping of the respective areas were also done during the field works. These were conducted to know about the location dynamics or environmental quality and their potential risk for the incidences of sexuality and STDs among the truckers.

1.6.7 Data Collection Procedure

Creating database on usual sexuality is one of toughest chores let alone informal heterosexuality. The issue of sexuality is seldom openly discussed in an orthodox conservative society like Bangladesh. Social and cultural taboos prohibit or make difficult to, even initiate discussions on the subject. Difficulties were faced in obtaining responses to the questions on such 'sensitive' topics. Hence it is needed to follow specialised method to collect these sorts of statistics.

In case of collecting the data on sexuality and other risk behaviors as well as on STDs, pre-empt images, personnel and set-up of the selected STD clinics were utilised. All the selected STD clinics had some extend of activities like outreaches, counselling and medicare facilities *etc.* Outreaches backed in motivating and building rapport with the members of the targeted population in the respective study sites. Clients who visited the centres were duly consented as per the WHO as well as GOB's ethical guidelines. Interested subjects were then requested to partake in a counselling session and face to face interview was conducted. Sometimes especially in cases of Tejgaon, interviews were undertaken through outreaches. The researcher himself performed most of the activities. The counsellors, medical officer and other personnel of the centres helped variously in conducting the interviews. Thus employing an interpersonal atmosphere, discussion on sexuality and STD related issues were made possible. It needs to note here that this part of interviewing *i.e.* regarding sexuality and STD was not done through direct questions and not recorded accordingly rather done through PRA techniques like ethno-biographies, unobtrusive observations and field notes were taken in details.

The other level of data *e.g.* at organizational or from secondary data were gathered mostly through informal discussion or sometimes recorded on the formal checklist. But the field data were much more critical and huge in number. Even the collection methods were different for different sections of the questionnaire. For example, socio-economic data were collected from direct questions and recorded on the free space of the questionnaire. On the other hand, questions on mobility behavior required explanation and answers were given in descriptive mode, hence recorded in separate notebook. However, collection activity was carried out over a period of four months during the September to December 1997. Even an extra month of time was also spent for necessary data correction.

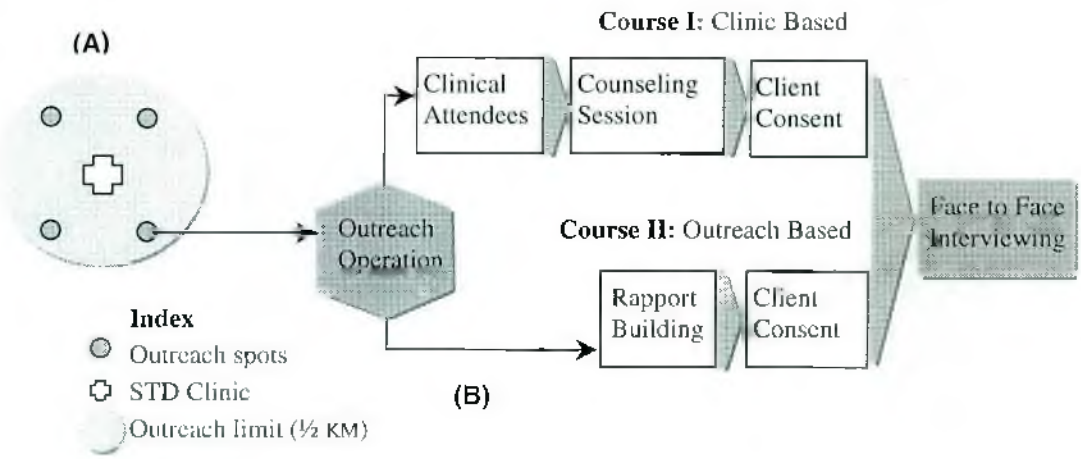


Figure 1.4 *Collection procedure of field data regarding sexuality and STD. In the left, section (A) shows the outreach spots that usually stretch over an area of ½ km encompassing STD clinic. While section (B) outlines the sequential steps of collection procedure in which two distinct sequences are shown.*

1.6.8 **Data Management and Analysis**

The collected data were huge in size, collected at different level and also with different mode. Hence huge deskwork for correction, compilation generalization was needed. First, as mentioned earlier, necessary data were collected at different level *e.g.* at organizational or from secondary sources and at respondent level. Secondary and organizational level of data were processed and transferred directly into the tabular frame created in the computer. While for field data, necessary deskwork for correction and generalization was needed for performing further analyses. The responses on STD and sexuality and other high-risk behaviors were not at all ready for use. These data were process and complied manually at home and then made ready for subsequent use. Other qualitative data were extracted by marking key words and themes. Finally, necessary data were transformed into quantitative form and entered into computer using 'dBase IV' software.

Simple statistical processing and analyses of these data were done in the computer. But the processing and analysis of matrix data were performed manually, since no computer softer were found to be available for doing this so. UCINET software is used to detect the network structure. This ware is neither available nor indeed usable for spatio-metric analysis.

1.6.9 **Research Design in Short**

In the conclusion, a short sketch of the whole research planning has been outlined in the flow diagram as shown in the following page. The Figure 1.4 shows that the study had started with some critical issues of sexuality and STD/AIDS and had converted these into spatial point of view. Keeping these in mind the research planning was designed in both the 'inductive-descriptive' and 'deductive-analytical' logical way of learning. The philosophical basis or logic of such an inter-looking system of learning process was also explained in this chapter. Thus the study started with a reconnaissance included organisational and qualitative survey. This is absolutely an inductive and descriptive method. Then with the learning of the *a priori* study, necessary theoretical or conceptual frames were searched at the literature reviewing stage. An extensive volume of literature covering epidemiology, sociology and geography was reviewed. However, some of the relevant explanatory-analytical conceptual frames have found to be fitted with the objectives of study. Later on, the study assumptions were derived; conceptual frame was formed; questionnaire was designed; the sampling procedure and data analysis techniques were determined. Finally, collection of necessary data form different levels and analyses were made and the report of the whole study presented in a conventional narrative way with the savor of map-based and diagrammatic presentation.

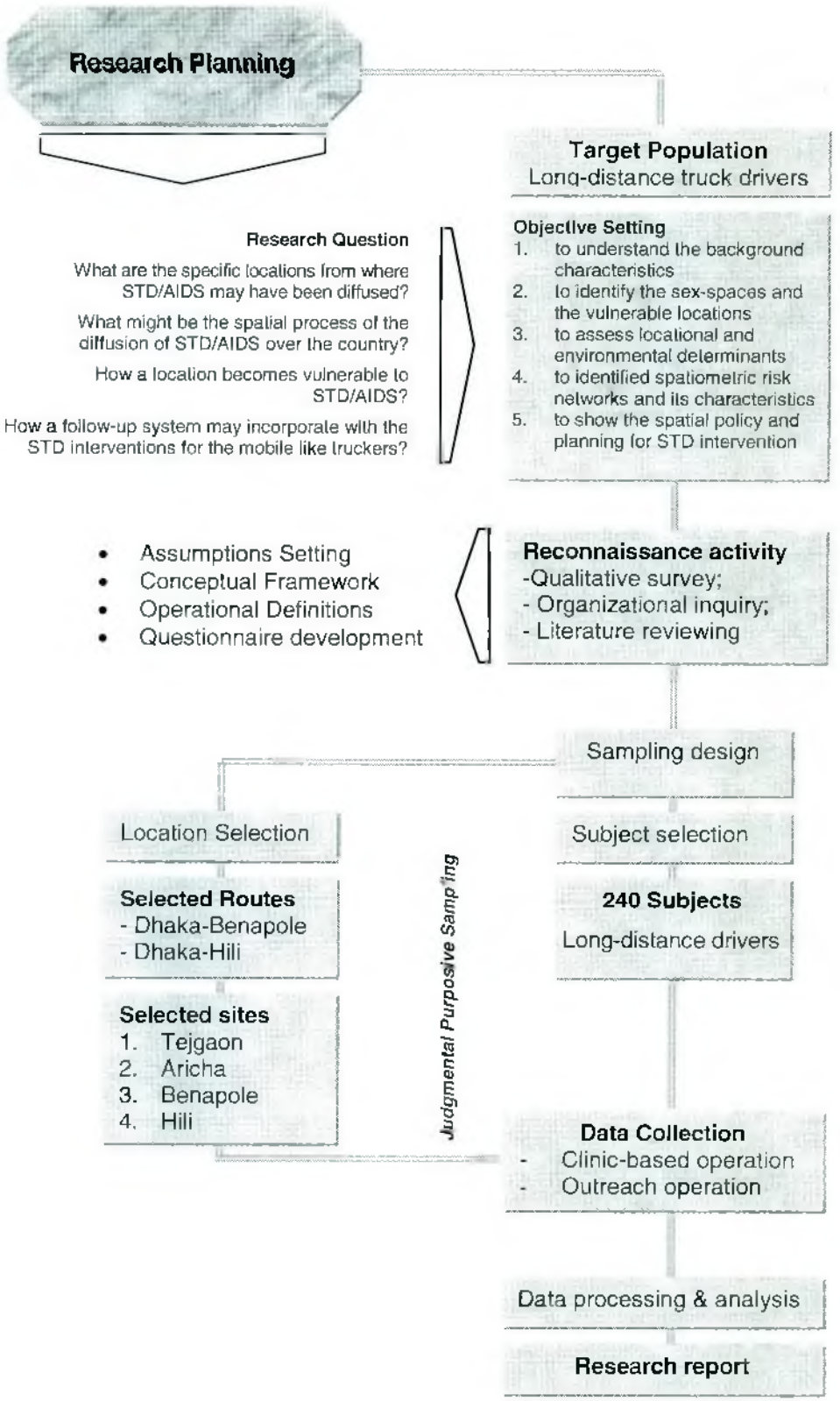


Figure 1.5 *Diagrammatic presentation of research planning and design*

1.7 Organisation of the Thesis

The study is necessarily an exploratory and descriptive in nature. However, some sort of cross-sectional matrix analyses were also made along with an understanding of location dynamics and environmental determinants of sexuality and risk of STD/AIDS. Since the primary focus of the study was to understand and creating database on spatial aspects of sexuality and STDs, then the whole research was organised accordingly. Following is a short description of the thesis outline.

Chapter 1 makes a prologue to the study in which the research questions, specific objectives, study design and methodological issues were clarified.

The Second Chapter plunge into the reviewing and analysis of secondary sources. This chapter was important in building footing-frame of the present research. The chapter also made proof of the rationale of the study. At the end of the chapter some remarks were drown on the basis of the literature reviewing and analysis and used these as the basic assumptions of the whole treatise.

Chapter 3 outlines the basal frame *i.e.* conceptual, theoretical, methodological and technical issues the thesis on which the whole study was cultivated. It is needed to note here that each inquisition of the study was followed by relevant theoretical or conceptual or some form of technical structure. The operational definitions and the sequential frame or in other words whole frame of the study were not produced subjectively but on the basis of *a priori* theoretical or conceptual frame. These are given at the end of the chapter as an essential output of this chapter.

Chapter 4 has three sections namely socio-economic and demographic characteristics; KAP and high-risk behaviors; and mobility behaviors of the respondents. The chapter in fact abridges several sociological, epidemiological and geographical backgrounds of the respondents as independent variables and by which cross-sectional and other properties were analysed.

Chapter 5 is the core of the thesis has several sections in which spatiality of sexuality_ the basic cause of STD/AIDS and the incidences of STD or the risk for STD/AIDS were explicated. The chapter therefore concerns with the prediction, simulation of future spatial pattern of STD/AIDS and also with the explanation of the geographical determinants of becoming a location vulnerable to STD/AIDS. The chapter ends with an endeavor to ordain spatial policy and planning issues.

In the conclusion, fist, major findings were summarized followed by some policy recommendations for STD/AIDS interventions and finally, possible applications and further research needs were also recommended as well as some hypotheses were put forward for the future empirical testing.

1.8 Limitation of the Study

- In the present study only the long-distance truck drivers were surveyed but the ordinary drivers and helpers were not included. The reason of the specific selection was to avoid complexity and due to time and resource constrains and partly due to the fact that helpers found to be nothing but the trainee-trucker, hence kept out this segment from the study.
- Only Dhaka-based trucker mobility pattern was drawn. But in fact the pattern is much more complex. It was evident during study that there were at least 5 major nodes of truckers flow other than Dhaka *viz.* Chittagong, Sylhet, Khulna, Rajshahi Bogra, Rangpur *etc.* Moreover, only inter-districts trips are considered, but local or intra-regional flow of truck was not taken for consideration.
- Spatiometric risk networks between different brothels was mainly explored and interpreted. But it was evident that sexual networking also exists between other hidden places but not identified and studied for the sake of confidentiality and ethical questions.

- The study was conducted along the two major truck routes in the country *viz.* Dhaka-Benapole and Dhaka-Hili. But there are other important routes that need to be studied.

1.9 Problems Faced and Field Experiences

The problems of socio-medical research in developing countries are said to be multifarious. While the present research was concerned with the 'sensitive' topic of sexuality and STD, which is seldom openly discussed in an orthodox conservation society like Bangladesh. Social and cultural taboos prohibit or make difficult to, even initiate discussions on the subject. It was evident in the field sessions that without knowing the respondents' socio-cultural status, mode and other psychological constructions, it is almost impossible to create database on usual sexuality let alone informal heterosexuality. One of the country's renowned virologists and the Chairman of the National AIDS Committee, Bangladesh (NAC) M. R. Choudhury once commented the STD patients from his long professional experiences as the "world-class' liar. Direct and written question on sexuality thence likely to be resulted nothing. Consequently, conventional questionnaire method has verily no use in this field. Given the paucity the researcher suggested mutated collection method, which is characterised by free, interpersonal, outreach-approached, participatory, rapport oriented, non-scheduled interviews and informal friendly discussions, or technically termed as ethno-biographies, unobtrusive observations.

Another interesting experience in the field was related to collection procedure. Researchers in this field should think of their outfit and attire as well as communication style and pattern. Researchers should not use such attire and accent or rhythm so that they seem to be serious, aristocrat and outsider. Gentlemen approach, sober language, judgmental terms and timidity may create inferior obsession among the participants.

Friendly attitude, colloquial accent, informality and offering 'tea-chatting' may help in penetrating into the deep of the research question.

The selection of interviewing places, environs and time are also important to think over. For outreach interviewing, somewhat dim and free or private places such as tea-stall, on the peak of the truck are found to be suitable. Darken environs and evening hours help to escape from blushing eye-to-eye shakes. On the other hand, counselling sessions, doctor's chamber *etc.* in the STD clinics was also found to be useful.

The last, though by no means least, problems are also from the researcher end and his family and professional milieu as well. The researcher and his surroundings are tag with conservative savour. It creates some reddening problems. The researcher thus never freely discloses his researched topic to his family kindred and other fellows. Even some have surprisingly questioned about the 'characteristic purity' (!) of the researcher and in view of the same awe and coyness the term 'sexuality' was expunged from the thesis title.

Chapter 2

LITERATURE REVIEWING

2.1 Introduction

The advent of HIV/AIDS has brought into being a new attention towards STDs around the world, especially since the beginning of 1990s. A good volume of studies covering clinical, laboratory based Experimental, epidemiological, sociological, behavioral, legal, political, and policy oriented, even philosophical, religious, and ethical aspects and issues have done up to the date and published internationally accepted research journals and other recognized sources. However, these works were compiled and circulated in the form of CD-ROM by different retrieval services and may be available on the wave sites of computer Internet system. The present researcher took this most-modern opportunity and consulted some of the internationally renowned retrieval services, such as 'Pop-line', 'Med-line', as well as 'National Retrieval System' developed and operated by Bangladesh Medical Research Council (BMRC). It is hoped that these excellent sources are well enough for covering STD/HIV/AIDS related works around the world. The articles that have been available on these sources since the 1990s were consulted. Except the highly clinical or experimental or pure bio-medical ones, all others relevant or quasi-relevant works including socio-behavioral, epidemiological, interventions related or action researches are considered for reviewing and analysis. However, other sources including seminar proceedings, monograph, reports, statistics and books and other unpublished materials were also handled. Unfortunately, no material had found directly related to the present research. Even no research yet to be conducted around the world let along Bangladesh, on STD/AIDS prevention from the spatial point of view, though a very few work found to have a little bit touch on geographical aspects. Following is a critical reviewing of the consulted secondary sources. The literatures were discussed thematically; major findings were documented and finally on the basis of the findings, a set of assumptions was developed.

2.2 Global Perspective

2.2.1 Prevalence, Public Health and Epidemiological Aspects

Sexually transmitted diseases (STD) is a major public health concern in most developing countries and now compounded by the advent of AIDS and HIV infection. The actual size of the problem represented by STD and HIV is unknown. Nevertheless, it is estimated that there are 333 million new cases of STD per annum and currently 15-20 million people world-wide infected with HIV (Adler, 1996). Plot and Islam (1994) did a global epidemiological review of sexually transmitted diseases in the 1990s with view of facing the challenges for control of the crisis. The review asserted that epidemiological trends of STD are strikingly different in various parts of the world. In the Northern and Western Europe there has been a spectacular decline in the incidence of STD, particularly gonorrhoea and syphilis. It is probably due to a combination of an early initiation of sex education at school, behavior change, condom promotion, and the wide availability of STD treatment. Similarly, Paget and Zimmermann (1997) consulting STD surveillance data from different sources, and tried to showed the declining trends of gonorrhoea and syphilis in Switzerland. The data indicated that there has been a decline in the number of cases of syphilis, and in particular, gonorrhoea since the early 1980s in Switzerland. Several factors were identified to explain the declines such as more effective treatments, more widespread use of antibiotics, marked changes in behaviors such as increased level of condom use *etc.* However two factors were thought to be played important roles in the declines. These includes first, as a result of the emergence of penicillinase producing strains of gonorrhoea, the introduction of new treatments for gonorrhoea in the early 1980s; second, the national AIDS prevention campaigns, which began in 1987 and has been associated with major increases in condom use among the Swiss population.

Surprisingly, the situation in the North America is far more complex. Although vast geographic areas and large population groups are having low level of STD, but others continuing to experience an epidemic of STD, particularly inner-city minority populations in the United States, where in fact today STD becomes an epidemic. More than 13 million new cases of these infections occur every year. Of all age groups, people 15-25 years old make up the largest segment of infected with STDs. Almost one-third of all reported cases occur among teenagers (Little, 1991).

Correspondingly STDs are common problem among the young New Zealanders, especially women. Dickson *et al.* (1996) determined the lifetime occurrence of sexually transmitted diseases among the young New Zealanders aged 21. The results showed that the rate was as high as the USA. Among the sexually experienced, 8.6% of the men and 17.3% of the women reported ever having had an STD. Genital warts and chlamydial infection were the commonest STDs among the men, and general practice was the commonest place for treatment, only a minority of people was treated at sexual health clinics. The risk of having an STD increased steeply with the lifetime number of sexual partners.

Pham Kanter *et al.* (1996) reviewed STD situation in South Africa through extensive literature survey published since 1980. They found the STD continues to be a serious public health problem in South Africa. Morbidity from both ulcerative and non-ulcerative infections, particularly in women, is also significant. Most South African STD data are derived from *ad hoc* surveys that traditionally focussed only on several major infections and particular urban centres.

In China, 10% of the population in major cities had syphilis, and had 50% prevalence in some rural minorities. But by 1964, STDs in China were virtually eliminated through a programme that destigmatized STDs, provided an infrastructure for case finding and therapy, and eliminated prostitution (Cohen *et al.*, 1996). However

the Chinese forceful approach may not be ideal for every where, especially in the democracies.

In developing countries both the prevalence and incidence of STD are still very high and STDs are a major public health problem marking up material morbidity and mortality. "Business as usual" is clearly not acceptable any longer. A better understanding of the determinants of STD epidemiology is essential for a more effective approach to STD control as well as recognising the limitations of each single intervention, be it medical or behavioural. The major challenges are to mobilise political commitment and public health programmes, and to apply the right mix of approaches, including medical, behavioural, societal interventions (Piot and Islam, 1994). Equally spatial or geographical input should be incorporated in the STD interventions.

2.2.2 Determinants of STD: Social and Behavioral Aspects

Aral (1994) found that determinants of sexually transmitted disease incidence have been described at the individual and population level of analysis. Some issues of measurement remain unresolved in the assessment of risk and preventive behaviors. In general, risk behaviors (sexual, substance abuse) and contextual determinants of risk tend to occur together. Population prevalence of many STD risk behavior is higher among minority populations of lower socio-economic status. In an another study Aral (1996) showed how the social context *i.e.* how race-ethnicity and poverty jointly as well as independently affected transmission dynamics of syphilis and other sexually transmitted diseases in south-eastern United State. He found that population of minority race-ethnicity and population of poverty are both youthful age composition and relatively scarcity of men and both populations live in areas of high poverty concentration. Sexually transmitted disease morbidity, particularly syphilis morbidity is concentrated in these populations. This social context creates potential sex partner

pools of high risk and high sexually transmitted disease prevalence, which carry a high probability of exposure to infection for each sex act. Pakianathan *et al.* (1996) conducted a study in Edinburgh, U K. between 1990 and 1994 on the patients with multiple sexually acquired infections. The result showed that individuals in lower socio-economic class were found to be at higher risk and older individuals at lower risk of multiple concurrent STDs. Thus he argued that age and socio-economic class were the only significant variables.

Seal and Agostinelli (1996) highlighted the importance of education and awareness of the riskiness of sexual behaviors. But Andersso *et al.* found in a group of Swedish teenage girls at 16 years of age that there were no significant differences in knowledge about various STD and STD protection between girls from different social classes or with respect to societal experience, age of coitarche. This knowledge had little influence on behavior. Similarly, Mulhall (1996) found that international travellers' level of safe sex knowledge has little to do with actual behaviors take place among travellers and with local inhabitants.

Franchini *et al.* (1996) in a preliminary study showed the adolescent sexual behavior and how it is associated with the increasing number of sexually transmitted diseases (STDs). They found great changes have occurred in the adolescent behaviour in the last twenty years and that has caused a great increase in the number of the transmission by sexual intercourse diseases. Buga *et al.* (1996) determined association between early initiation and a high level of sexual activity, low contraceptive usage, and a high rate of adolescent pregnancy and STD, in rural settings of South Africa. Hiltabiddle (1996) made some suggestions for health care providers to increase condom use among the adolescent in the light of theoretical framework of Health Belief Model.

While in contrary to the usual belief, Lemardeley *et al.* (1995) had seen different findings in a critical rural region in Senegal, where the population characterised by large seasonal migration, a high divorce rate, and frequent polygamy. They found no significant difference between the sex, age, and marital status of HIV seropositive and seronegative individuals or STD patients. Gwati *et al.* (1995) almost found same in a high-density suburb of Harare, Zimbabwe. No association of STD was found with marital status, place of residence of wife, age, level of education or employment, rather STD was strongly associated with alcohol consumption. These results strongly suggest that alcohol consumption is an important risk factor for STD. Hence they suggested for further research to explore the relationship between alcohol consumption and high risk sexual behaviour. It was also evident in another African national household survey that alcohol overshadows illicit drug use as a risk factor for STDs. Men and women who report a history STD are significantly more likely to have a history of alcohol drinking, independent of high-risk sexual activities and demographic characteristics. A high rate of change in sexual partners over the last five years also increases the change of STD infection. Sexual orientation is a major STD risk factor among men but not among women. Although both black men and black women are at greater risk of STD than are those in other racial or ethnic groups. Results indicate that black women's greater likelihood of having sex with men who have multiple partners, rather than their own rates of partner change, make with the crucial difference between their risk and that of white women (Ericksen and Trocki, 994). Moses *et al.* (1994) investigated the sex related behavioral factors in Kenya. The study revealed that male STD patients, who are unmarried, and or married but living apart from their wives, reported a higher mean number of sex partners in the previous three months than did male clinic or community controls. Unmarried female STD patients reported a higher mean number of sex partners in the previous three months than did unmarried female clinic or community

controls. Both male and female STD patients were likely to report having been involved in commercial sex transactions in the previous three months than clinic or community controls. However, considerable heterogeneity in sexual behavior was apparent. In multivariate analysis, the most important predictor of STD acquisition for both male and female was the number of reported sex partners in the previous three months. In addition, for men only, marital status (unmarried, or married but living apart from their wives) and purchasing sex were important predictors of being STD patients. These data confirm the importance of commercial sex in STD transmission, and suggest that men play a bridging role between female sex workers and general population of women.

Finally, Wasserheit, J. N., and Aral, S. O. (1996) showed that each STD epidemic evolves through predictable phases, shaped by dynamic interplay among the pathogen, the behaviors of sub-populations in which it emerges, and the prevention efforts that are developed to limit its impact.

2.2.3 **Determinants of STD: Geographical and Ecological Aspects**

Thomas along with Tucker (1996) showed the development and use of the concept of a Sexually Transmitted Disease Core or `STD Core'. A small proportion of people experiencing a sexually transmitted disease (STD), who are frequently infected or often transmit the infection, has been referred to as the `Core' or the term has been used to refer to geographic areas with large numbers of cases. This concept is useful in identifying strategic points of interventions to reduce STDs.

Matondo *et al.* (1998)) identified that there was a clear tendency for various STD cases to locate along major roads and rail transport routes. Foci of gonococcal infection were concentrated mainly in the densely populated areas, whereas chlamydial cases were more evenly spread. Hence in the conclusion they recommended further

study on the identification of foci gonococcal and clamydial infection and apparent location of these infections along the major transport routes.

According to Holmes (1994), three determinants of the rate of spread of STDs are behaviors, the mean duration of infectiousness, and the mean efficiency of sexual transmission of each STD. Underlying ecological and behavioural factors that operate through one or more of these direct determinants lie on a continuum, ranging from those most proximate back to those more remote (in time or mechanism) from the direct determinants. Most remote and least modifiable are the historical stages of economic development that even today consciously influence pattern of sexual behaviors. Next are the distribution and changing patterns of climate, hygiene, and population density; the global population explosion and stages of the demographic transition; and ongoing changes in human physiology (*e.g.* menarche at younger age) and culture (*e.g.* later marriage). More proximate on the continuum are war, migration, and travel and current policies for economic development and social welfare. Most recent or modifiable are technological and commercial product development (*e.g.* oral contraceptives); circumcision, condom, and contraception practice; pattern of illicit drug use that influence sexual behaviors; and the accessibility, quality, and use of STD health care. These underlying factors help explain why the curable bacterial STDs are epidemic in developing countries and why the United States is the only industrialised country that has failed to control bacterial STDs during the AIDS era.

While Aral (1994) rightly pointed out that in general, risk behaviors and contextual determinants of risk *i.e.* geographical, ecological or environmental tend to occur together. He found that populations of minority race ethnicity and populations of poverty are live in areas of high poverty concentration. Thus he pointed out social context *viz.* poverty, minority race ethnicity *etc.*, along with geographical clustering

jointly contribute to persisting syphilis morbidity, particularly in the south-eastern United States.

2.2.4 Studies Particularly on Trucker community

Shrestha with others in 1992 conducted a targeted intervention research (TIR) on risk and need along the truck routes in the rim areas connecting Bangladesh, and Nepal and also the Northern India. This is one of the very few individual reports on trucker community and that somewhat from spatial point of view. The assessment was done to determine the risk profile of transport workers like truckers and to identify the potentials of STD/AIDS intervention for the community. The methodology of the study was interesting_ absolutely qualitative and unconventional *i.e.* travelled along the truck routes of Northern India between the borders of Bangladesh and Nepal and stopped at major truck stops and then interviewed key informants, hitch-hiked with truckers *etc.* The report uncovered apprehensive facts that there was a high level of sexual networking by those working in and along the truck routes. Truckers were often engage in commercial sex at truck stops; in addition, some truckers also had sex with truck boys. Condom use was reported to be very low_ partly due to lack of access to condoms along the truck routes or due to lack of consciousness regarding safer sex with condom. The report also warned that there was a high risk for the transmission of HIV/AIDS along the borders of India, Nepal and Bangladesh and made suggestions for immediate interventions, especially at large truck stops, where truckers had multiple day's stopover and have access to commercial sex. They thus identified these locations most vulnerable to STD/AIDS for truckers.

Finally, a summary picture of reviewing and analysis of the selected articles covering the global scenario can be drawn, which shown in the Table 2.1 of the following page.

Table 2.1 **Selected Studies on STDs around the Globe (between 1990-1997)**

No. of available articles	Topics	Major Findings
7	Prevalence, public health and epidemiological aspects	• There are 333 million new cases of STD per annum and currently 15-20 million people world-wide infected with HIV; • In the north America and Western Europe there has been a spectacular decline in the incidence of STD, but in the developing countries both prevalence and incidence of STD are still very high and are a major public health problem;
13	Determinants of STDs: social and behavioural aspects	• Age, socio-economic class, race-ethnicity, and poverty are found to be significant variables; • Education and awareness may reduce risk of sexual behaviors; • Early initiation, high level of sexual activity, and not using condom are associated with the increasing number of STD cases; • Alcohol consumption, drug use are important risk for STD; • STD patients who living apart from their wives, reported a higher mean number of sex partners; • Multiple sex-partners, high rate of change in partners, increase the chance of infection; • Marital status, living apart from the family, and purchasing sex were important predictor of being STD patients and men playing a bridging role between CSWs and general women population; • STD epidemic evolves through predictable phases;
4	Determinants of STD: geographical, ecological, environmental aspects	• The concept of `STD Core' which refer to geographic areas with large numbers of cases, is useful in identifying strategic points of interventions to reduce STDs; • There is tendency of some STD cases to locate along major roads and rail transport routes. Foci of gonococcal infection were concentrated mainly in the densely populated areas, where as chlamydial cases were more evenly spread; • Underlying ecological and environmental condition are found to be most remote and least modifiable determinants of the rate of spread of STDs; • Poverty, minority race ethnicity *etc.*, along with geographical clustering concurrently contributes to persisting of syphilis morbidity;
1	Studies particularly on truckers community	• Truckers are found as the high-risk group since they are reported to have high level of sexual networking at large truck stops or at stopovers and have access to commercial sex. These locations are extremely vulnerable to STD/AIDS;

2.3 Bangladesh Scenario

2.3.1 Prevalence, Public Health and Epidemiological Aspects

After advent of AIDS a good number of studies were done on different communities in both urban and rural settings in Bangladesh to determine the prevalence and other epidemiological aspects of different STDs. But no systematic and nationwide reporting system or national survey and surveillance system for STD yet to be developed here in Bangladesh. Even, before 1990, no comprehensive study in this field was done except few isolated attempts of which mostly were based on different Medical College and Hospitals and some others were also done on individual's interest (Mian and Karim, 1993). Moreover, many people with an STD never seek health care and conceal their diseases, even some people, especially women, remain asymptomatic or show few symptoms (WHO, 1991: p.89). Hence it is very difficult to assess the STD situation in Bangladesh. However, recently several non-government and international organizations *viz.* ICDDR, B, CARE, AVSC, Population Council, VHSS, and several local NGOs like AIDS Awareness Foundation, Women Health Coalition, CEDAR, JSS *etc.* are playing good role both in research and action. All these studies had been done to see the seroprevalence of some selected STDs among the high-risk groups and shown the prevalence of some STDs to be quit high in Bangladesh.

An international organization namely FHI (Family Health International) in an attempt to uncover the comparative prevalence of GUD (genital ulcer disease) among the women patients attending the STD clinics in different countries. The result showed that high prevalence (29%) for Bangladesh (Roddy *et al.* , 1989). Even in the remote village, high prevalence of different STDs was discovered. For example, Wasserheit and others (1989) seen 68 *per cent* of the sample rural women at ICDDR, B coverage area in Matlab had clinical or laboratory evidence of RTI/STD.

Similarly, Save the Children of USA conducted a study at Rangunia on women of reproductive age had revealed that 54 *per cent* had a history of suggestive of present or past RTI/STDs (Bhatta, 1993). Same picture has found among the rural women in a very recent study (Hossain, M.A., 1997). These figures are absolutely alarming. The scenario of urban Bangladesh is even worse. Moreover, some statistics indicate the rapid increase of STD cases in the country. A consecutive monthly report from Khulna Hospital shows the increasing STD records as follows: 1185 STD cases recorded in June, 1991, 1391 in July, 1991, 1493 in August, 1991 and 1543 cases recorded in September, 1993. The reports from different medical collages, family planning and MR clinics of Dhaka City clearly indicate the thriving figure of STDs in the city (Mian and Karim, 1993).

While some studies focused on the prevalence and incidence cases among the high-risk population of the country. Taufiqunnesa (993) found that frequency of STD was highest among the sexually more active age group of 20-39 years, among unmarried males but married women, among low socio-economic group of labourers, transport workers, as well as the literate group showed a high frequency. First of all CSWs are the most vulnerable to STDs and they have strong role in spreading of STD. Many studies underlined this fact by uncovering the high rate of various STD ranging from 15 *per cent* to 57 *per cent* among CSWs (Kabir *et al.*, 1989; NAC, 1990; Choudhury *et al.*, 1989; Khan *et al.*, 1992; VHSS, 1993; Sarkar *et al.*, 1997). These studies also indicate that floating gay girls (FGG) or street girls are more prone to STDs than institutional or brothel based sex workers. Another study estimated that almost all CSWs have had a STD at some times (Khan and Arefeen, 1992). Besides, several low income groups living in slums of Dhaka and other big cities were found to be highly prone to STDs, such as Keith *et al.* (1997) very recently explored that hepatitis B

carriers and positive syphilis was high in the Dhaka's slum population. Nevertheless, a very little is known about the general people and overall situation of STD in the country.

2.3.2 Determinants of STD: Social and Behavioural Aspects

There are plenty of studies have done on another important venue of STD/AIDS research like knowledge, attitude, behavior and practices *i.e.* KABP or in other words high-risk behavior on different community in both urban and rural context in Bangladesh. Most of these studies were qualitative description or operational research in nature. Researchers from different NGOs, operation research organizations were involved in such activities and mostly were performed during the AIDS threatening era of 1990s with direct support from international donor agencies. One of such was done Ruchira Tabassum Naved (1997) of Save the Children, USA, who with the help of qualitative exploratory research design attempted to explore risky sexual behaviors in a conservative society like rural Bangladesh. She found that instead of negative social attitude, risky sexual behaviors *e.g.* multiple-partner sexual practices; homosexuality etc were prevalent in such societies and these were not considered risky behaviors unless it leads to pregnancy. Even some studies showed that a very few villagers in Bangladesh yet heard the risk of AIDS, the most murderous STDs of the present world (Fulton *et al.*, 1997; Hanifi *et al.*, 1997; Rahman, *et al.*, 1997). Whereas several studies covering same issues and with same style have done but on different communities in urban context. Following 'Health Belief Model' and Dixon-Muller's analytical framework Khan and Faisel (1997) measured the sexuality and sexual behavior of male STD patients in Dhaka City. With same qualitative approach adding a bit quantitative savor Hossain with others of Population Council, Bangladesh, (1996) focussed on professional blood donors; Sharma and others (1997) on slum dwellers; Ahamed and Hawkes (1997) on

CSWs. All these three studies shows that high risk behaviors *viz.* having multiple sex-partners, visiting CSWs, pre-marital or extra-marital sex, oral and anal sex, even group sex, lack of knowledge of safer sex and practices, IVD users and sharing needles *etc.* were more or less common in some socio-economic groups in urban Bangladesh and many of the members had history of STDs.

2.3.3 Determinants of STD: Locational and Environmental Aspects

Very little is known on environmental determinants of STD. Myaux *et al.* (1997) examine the location of STD cases in the community and possible environmental risk factors for sexually transmitted diseases in a rural setting of Bangladesh. This is only the research on STD conducted from the geographical point of view and using well known spatial analysis, techniques and tools like creating 'geo-reference' file and 'isoline' technique performing nearest neighbour test from GIS. Data were aggregated at the level of *bari* (a village house) and STD cases were plotted on the nap against the location of *bazaar*s and highly populated areas. The result showed that the spatial distribution presented no pattern. The prevalent cases were quite homogeneously distributed across the study area, with only a slight clustering in case of chlamydia infection. The location of the cases was neither significantly related to the proximity of a *bazaar* nor to a crowed environment.

The negative result is most seemingly due to the improper way of putting data for analysis. In this research the data of STD cases were aggregated in relation to the residence of the subjects, this by no means indicate the actual place from where the concerned person acquired the disease. Note that population mobility may have created more complicated situations concerning exposure to disease. Due to population mobility, the place of exposure may have been different from where the person is living at the time of diagnosis (Schærstrom, 1996). Thus it is important to

aggregate spatial data in terms of the place origin instead of present location of STD patients. The present research however considers this strategy for collecting STD origin as perceived by the samples.

2.3.4 Studies Particularly on Trucker Community

There are only few studies have found to be done thoroughly on trucker community. Some local NGOs of India and Bangladesh did this work as a part of project assessment or a preparatory work for project development. None of these reports were seen in precise published form. However, some disaggregated facts on trucker were also found in different studies where truckers also covered as one of the samples (*e.g.*, NAC, 1992; Bhulya *et al.*, 1995 *etc.*). Most seemingly truckers were exclusively studied first in 1995 by two local NGOs named AIDS Awareness Foundation and CEDAR as part of their project development on said community. Subsequently each of these organisations started STD/AIDS prevention program for truckers and the later expeditiously captures experts and donors' attentions. In the CEDAR population assessment truckers were exposed as the most vulnerable to STD and AIDS. Their very socio-economic background, professional hazards, and distorted social image frequently led them toward irregular lifestyle and high-risk behaviors and practices. The report also indicated high rate of STD incidents among the community. But their knowledge, attitude, beliefs in relation to sexually transited diseases was far from the truth. Even they were not aware of the name and danger of the deadly disease called AIDS. Almost similar observations also asserted by Archo (1993). This is the first anthropological work on truckers but exclusively on sexuality. He found that 60 *per cent* of the long distance truck drivers had sexual relationship with CSWs twice a month, and most of them did not use condom in every occasion.

Table 2.2 **Selected Studies on STDs in Bangladesh (between 1990-1997)***

No. of available articles	Topics	Major Findings
15	Prevalence, public health and epidemiological aspects	• High prevalence of STDs in both rural and urban areas in Bangladesh, even rapid increases was recorded especially in the big cities; • STD was highest among the sexually more active age group of 20-39 years and among unmarried men but married women.
8	Determinants of STDs: social and behavioural aspects	• Instead of negative social attitude, high-risk behaviors *e.g.* homosexuality, having multiple sex-partners, visiting CSWs, pre-marital or extra-marital sex, oral and anal sex, even group sex, lack of knowledge of safe sex and practices, IVD using and sharing needles *etc.* were more or less common in some members of different socio-economic groups in both urban and rural Bangladesh. • Slum Dwellers, IVD users, Truckers, Migrants workers, CSWs, were found to be the 'core' or 'high-risk' group;
1	Determinants of STD: locational and environmental aspects	• No spatial pattern STD incidences and locational dynamics or environmental factor that may cause STD was found;
3	Studies particularly on truckers community	• Established as the high-risk group. High level of sexual networking and STD positive cases was found;

Note: *Some of the literatures were published or workout some years before the period of years mentioned. The findings and the reference of these articles though put in the text, but the result of these has not been incorporated in this analytical table. Therefore, the table strictly follows the time period of 1980-1990.*

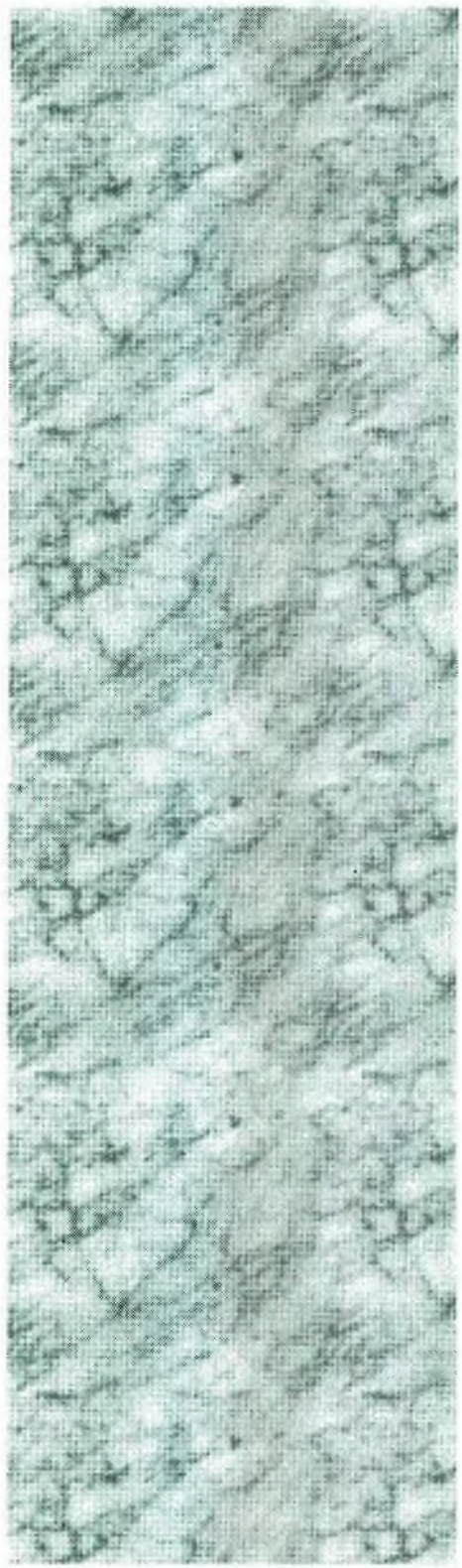
2.4 Assumptions of the Present Research

The critical analysis and reviewing of the selected articles has been summarised in the Table 2.1 covering the global part and the Table 2.2 containing the Bangladesh scenario respectively. The tables, however, shows the analytical findings of the both perspectives. Therefore, with the findings it was possible to determine a set of basic assumptions from the above analytical findings on which the present research has been cultivated. These are as follows:

- Established that several risk behaviors such as alcoholism and addiction, multiple sex partners and high rate of change in partners *etc.* are the most important predictor of being STD patients and HIV infected as well;
- Established that not using condom is associated with the increasing number of STD cases and equally associated with the chance of HIV infection;
- Established that infection of STDs increase the chance of being HIV infected;
- Established that men play a bridging role between female sex workers and general population of women;
- Established that underlying ecological and environmental condition of particular location are the most remote and least modifiable determinants of the rate of spread of STDs and hence some locations becomes vulnerable to STD/AIDS;
- Established that Truckers in Bangladesh are established as the most mobile community as well as one of high-risk groups and thus highly vulnerable to STD/AIDS;
- Established the high prevalence of STD among the core-groups including truckers *etc.* suggest the potentially of spread of HIV/AIDS in the country.

Chapter 3

THEORETICAL AND CONCEPTUAL ISSUES



3.1 Introduction

Harvey (1969) rightly noticed that fact without theoretical coherence and framework will remain isolated and dispersed. Although the study was exploratory in nature but not explored thoroughly inductive way. Rather theoretical cohesion was searched and established structures were used to organise the empirical data. Even the conceptual structure of the study was developed under the shade of existing theoretical literatures. The study necessarily consists of three issues namely spatiality, vulnerability to STD/AIDS, and the truckers. The first one is of geographical and the next one is of epidemiological. These two were fitted into each other dimensions or in other words epidemiological concepts of STD were transformed into spatial dynamics. The ultimate focus of the study was the truckers in Bangladesh, on which no literature was available; hence some characteristics of truckers were also gathered through organisation and qualitative survey and epitomised here for basic understandings. Finally, drawing on these theoretical discussions, some operational definitions were made ready as well as a diagrammatic scheme of conceptual frame of the whole study was illustrated as the end product of the chapter.

3.2 Theoretical and Conceptual Issues

3.2.1 The Concept of Spatiality

Space is one of the most exercised concepts as well as approaches in geography. German philosopher Kant pointed out two perspectives in geography: space and time. Hartshorne's seminal inquire into `The Nature of Geography (1939) first concluded the functional integration of phenomena over space_ this fundamental function of the concept of space in his thesis prepared the way for the development of a formal `spatial science'. Later on, Schaefer (1953) proclaimed that spatial relations are the ones that matter of geography, and subsequently Whittlesey (1954) proposed

space as the basic organising concept of the geographers. Thus it was the late 1940s and early 1950s that the conceptions of space become a recognisable tradition of inquiry in modern geography (Pooler, 1977). Most physical geographers continue to accept a view of space defined as three-dimensional Euclidean in which action occurs by contacts, whereas many human geographers now interpret space as being socially constructed, but here there are many different conception of space (Sake, 1980:50). However, in human geography space has been used from different senses such as: absolute, relative and relational concepts of space. Blaut (1961) distinguished these three conceptions of space used by the geographers. He showed that geographers conceptualise absolute space as distinct, physical and eminently real or empirical entity in itself, and relative space as merely a relation between events or an aspect of events, and thus bound to time and process. While almost similar to the later conceptions another view of space in social thought was proposed by Harvey (1973). In his words, there are no philosophical answers to philosophical questions that arise over the nature of space_ the answers lie in human practice. The question 'what is space'_ is therefore replaced by the question 'how is it that different human practices create and make use of distinctive conceptualisations of space? Thus he calls a relational conception of space, in which space is contained in objects in the sense that an objects can be said to exist only insofar as it contains and represents within itself relationships to other objects. Therefore, spatial analysis becomes social analysis and vice versa (Harvey, 1973: Chap.1). The famous British geographers Haggett (990) used the word 'mirror' as metaphor and argued that if the historian uses mirrors to look back and the physicist uses mirrors to look forward, then the geographer's use of the mirror analogy lies in a different dimension_ that of space (Haggett, 1990). He also argued that the essential structure of geography is spatial and its most common form is the map. To Haggett, spatiality of phenomenon is the 'geographical mirror' which can be shown through map.

He suggested the practical and pragmatic approach of geography such a way that if science is the art of soluble, then much of geography is the art of mappable. Haggett, in his book 'The Geographer's Art' used the geographical mirror to explore the geographical space, and to him, spatiality is can be seen through map comparison, *i.e.* areal differentiation, locational analysis, map analysis *etc.*

However, drawing on the theoretical discussion above, it now seems reasonable to formulate an operational definition of space for the need of the present research. Before doing this it is needed to recall the focus of the present research and use of the conceptions of space. The present study is to identify, analyse, map and explain the spatial aspects of sexuality and STDs among the targeted community. In general, geography as a spatial science includes the aspects like spatial/geographical distribution, structure, process or forms, pattern, spatial interactions through population mobility, spatial linkages or networks, it's hierarchy, order *etc* and changes of these qualities over time. These can be produced for descriptive purpose as well as for meeting analytical and explanatory deliberation.

Now, it is the question how sexuality and STD is related to these spatial aspects. In answering the question as well as need for the present research several operational terms and concepts are derived scientifically with basis of above theoretical framework. Thus sex-space, spatiometric risk network, spatial mobility behaviors STD Core *etc.* are derived. The sex-space is defined to refer certain locations or places used for commercial sexual purpose. This way one can describe and map the spatial identity of sexuality, even can show the mode in which space is organised by and implicated in the operation of commercial sex activities. This space sometimes may be hidden *e.g.* parks, hotels *etc.* used by the floating CSWs; or may be exposed or institutionalised *e.g.* formal brothels. STD-Cores refer to that places, which are suspecting by the respondents to be the origin of their respective incident of STD. It may be reasonable to

assume that an STD victims should have been able to recall and identify the potential places from where he had acquired STD. Especially, those who are not frequent in purchasing sex; or those do not have more sex partners in different locations. While spatiometric risk networks refers to spatial interaction between different sex-spaces. However, due to the physical, real or empirical existence, these spaces and the interaction between them can be identified, measured and mapped. Since the concept of this space is not similar to those of physical geographers' three-dimensional Euclidean, then geometrical properties of actual directional or distance were not considered. Rather for analytical purpose, topological properties *e.g.* accessibility, connectivity, were calculated and analysed with the help of graph theoretic algebraic technique. Therefore, in the present study, concept of space rather turns towards mathematical, mental or ideological point of view. Then here the sex-space is essentially relative, but precisely relational. Using the spatial conception with the above view, it is now possible to made some critical transformation of socio-medical and epidemiological concepts of sexuality and STD into spatial frame, such as:

Table 3.1 **Conversion of Epidemiological Concepts into Spatial Perspective**

Socio-medical & Epidemiological	**Transformed into Spatial Frame**
Institutional sex business	Formal or institutional sex-space
Floating/non-institutional sex business	Informal or Hidden sex-space
Risk network	Spatial network
Sociometric risk network	Spatiometric risk network
Sex-partners	Sex-partners in different places
Floating CSWs	Floating CSWs concentrations
STD-core (person frequently infected with STD)	STD-core (unusual concentration of the incidence of STD)
Sexuality suspected to be the primary cause of STD	Sex-spaces are suspected to be the primary cause of STD

3.2.1.1 Graph-theoretic Algebraic Technique and 'Spatiometric Network'

The branch of mathematics that investigates the properties of the simple topological diagrams that known as `graph'. The Swiss mathematician Leonhard Euler (1703-83) is said to be the father of this 'Graph-theoretic Algebraic Techniques'. His works on the structure of networks laid the groundwork for a major branch of mathematics, 'Graph Theory'. A graph identifies the terminals and junctions of the network and links between them. However the actual or geometric spacing of such terminals and junctions and the lengths of the links are not considered in this theory.

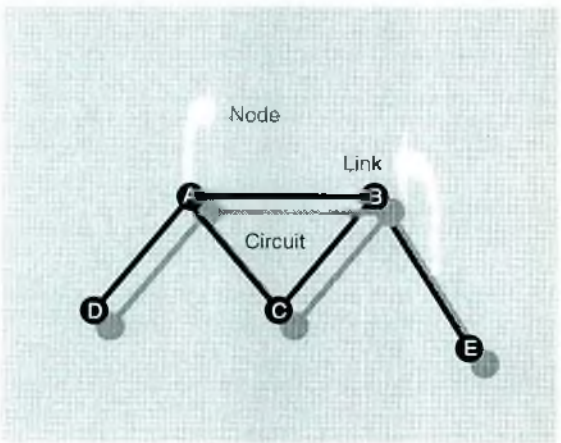


Figure 3.1 *A Graph and Its Elements*

The figure 3.1 shows a chimerical graph where the elements of a graph is also shown such as: `nodes' or also known as vertex (plural: vertices), `terminals', `junctions', intersections, `zero-cell' `points', `synapses', *etc.*), and `links' (also known as 'edges' `routes',). Nodes A-B-C form a complete circuit. The link between two vertices may be one way or directed *i.e.*. A to B, but not B to A. This situation is called 'Directed graph' or 'Digraph'. While, two-way linkage between vertices is called 'Undirected Graph'. There are other distinctions such as "Planar Graph' and 'Non-planar Graph'. Planar graph can be drawn in a single plane without links intersecting except at vortices, while in 'Non-planar Graph' such drawing is impossible, *e.g.* airline networks are usually non-planar. Another distinction is between 'Unitary Graph', where every vertex is connected with every other vertex; and 'Divided graphs' where several disconnected sub-graphs exist. The final distinction is 'Null Graph' in which the

individual nodes are not connected; 'Connected Graph' in which each node is connected to at least one other nodes; and a complete Graph' in which each node is connected to every other node (Figure 3.2).

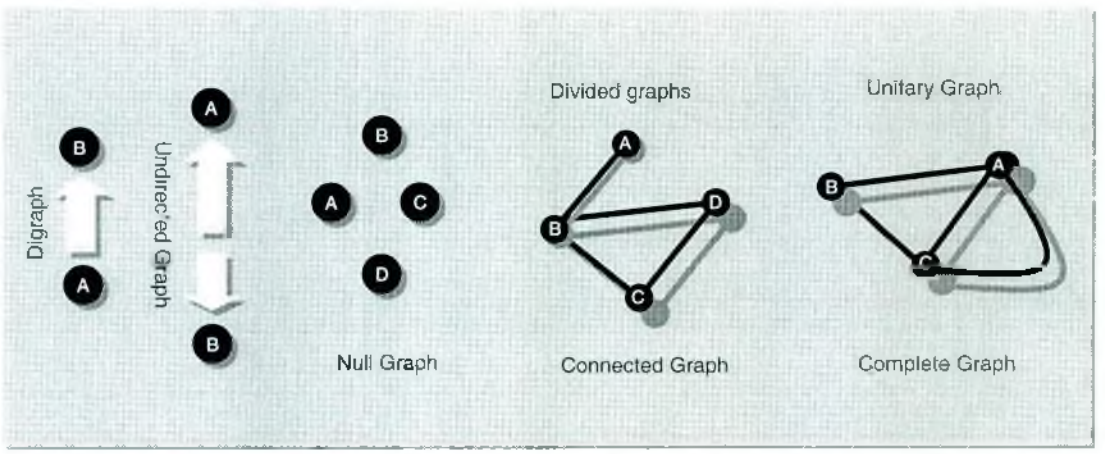


Figure 3.2 *Types of Graph*

The appeal of the graph theory is multitudinous. For instance, graph can be drawn to represent many geographic networks. The theory was first emphasised in transport geography by W. L. Garrion, D. F. Marble (1961), K. J. Kansky (1963) and their associates. The adoption of graph theory and related algebra in transport geography or network geography has led to recognition that the problems involved are shared by other areas of human geography, *e.g.* analysis of pattern of social contacts or social networks (Jonhston, *et al.,* 1981: 39). In addition to descriptive studies geographers have attempted to account for the existence and location of individual network elements *e.g.* port, motorway, *etc.* and for the pattern of whole networks. Even an inferential relationship can be demonstrated between network form and other geographic variables (Chorley and Haggett, 1974). In recent years, a few authors have

related this concept with another known geographical term 'spatial interaction' and attempted to explore the spatial manifestation of social contacts (Morrill, 1974; Johnston, 1981:320).

Other than geographers, several academician *viz.* sociologist, epidemiologist variously used this theorem. In epidemiology, network analysis is an emerging field that helps explain human immune deficiency virus (HIV) infection, HIV related risk behaviors and the spread of other infectious diseases (Klovdahl, 1985; Haraldsdottir, 1992; Woodhouse, *et al.*, 1994; Neaigus, *et al.*, 1994; Klovdahl, *et al.*, 1994). Some network studies investigate subjects ` egocentric' risk networks_ those with whom a subject engages directly in risk behaviors. Other, look at 'sociometric' network structures, composed of patterns of relationships involving risk behaviors among large numbers of subject. Sociometric risk network, which describe the direct and indirect linkages through which describe HIV and other similarly transmitted agents can be transmitted among persons at risk, provide a structural model for analysing the kind of linkage used in contact tracing (Auerbach *et al.*, 1984).

It has been argued that sociometric risk networks structure the flow of infectious agents in communities and thus provide unique opportunities for interrupting such flow (Klovdahl, 1985). Individuals' locations in such networks may determine the proportion of their contacts who are infected and thus may help determine their own probability of becoming infected. Sociometric network location, therefore, can define an aspect of HIV risk that can not simply be reduced to the amount of high-risk behaviors in which an individual engages. Network techniques, for ex-ample, might explain why race/ethnicity has often been found to be a significant predictor of HIV infection, even when risk behaviors are controlled (Frieddman, *et al.*, 1995).

However, for meaningful STD/AIDS epidemiological study, researchers of this field introduced somewhat specialised data and categories. One of the examples can

be the recent work of S. R. Friedman and his associates (1997). They have used a particular characteristic of sociometric network location: membership in the `2-core' of a large connected component. These terms of network structure are illustrated in Figure 3.3. In the figure, among 11 subjects, one component (c) is unlinked, and there are two separate connected components *viz.* one with eight members (d through k), and other with two members (A and B). A component of a network structure is consist of either an unlinked individual person/member or may be of a set of connected persons/members. Similarly, a connected component is defined as a set of persons/member who all have direct or indirect links to each other. Two components of the above graph (`a - b' and `c') are separate, therefore, if no member of either is linked to any member of the other. Within large connected component (members are: d, e, f, g, h, i, j, and k), there is a 2-core of five members (members are: d, e, f, g, and h) *i.e.* in the large component these five members form 2-core, since each is linked to at least two other members of the core. This core is a technical term first developed by Seidman (1985) and hence often called as `Seidman 2-core'. This epidemiological term (2-core) as shown in the figure 3.3 can be explained with the basic concept of graph-theoretic algebra, where a *K*-core is a sub-graph in which each node is adjacent to at least a minimum number, *K*, of the nodes in the sub-graph (Wasserman, *et al.,* 1994). While subject `I' of the large connected component is not in the 2-core membership, because 'I' is linked only to one 2-core member (*i.e.*. connected with subject 'H'), and finally subjects 'J', 'I' and 'K' of the large connected component constitute the periphery of this component. Thus it is clear that if one or more members of this core become infected, the 2-core of the large connected component has the potential to act as centre of HIV or other STDs transmission both with in itself and also outward to the periphery members (Friedman, *et al.*, 1997).

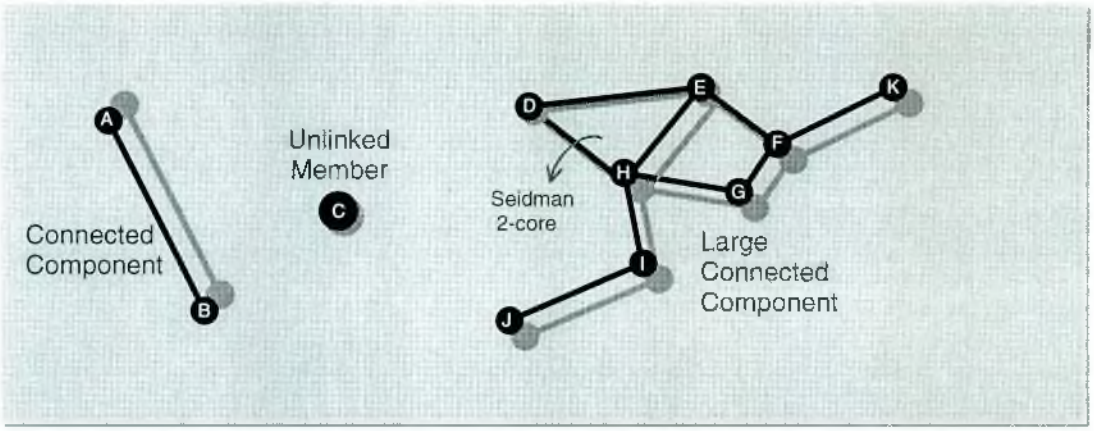


Figure3.3 *Epidemiological Network's Structure*

For network data concern, S. R. Friedman and his associates (1997) simply asked the subject to provide with the information about up to 10 persons with whom they had sex during 30 days, their nature of relationship along with risk behaviors of the subjects and their network members. The linkage between the objects was also confirmed. And as to the question of the structural categorise of the network for operationalize the concept of sociometric risk network location, Friedman and his associates categorised the network data into five components and defined these as distinct locations in the network structure. These are (I) a 2-core of the large connected component; (ii) the periphery of the large connected component; (iii) members of smaller connected component; (iv) members who have sex partner but not linked with above subjects *i.e.* not linked he project participants; and (v) unlinked subjects. These categories in fact form a scale of decreasing (or vice versa) high-risk social connection to other subjects of the community (Friedman, *et al.*, 1997; Seidman, 1983).

As noted earlier that the assignment of the present research is to transform several sociological and epidemiological concepts using in STD/AIDS research and

development into spatial framework so that an alternative approach can be developed, which in turn facilitates conventional STD/AIDS preventive measures to some extend splendid and more effective. The epidemiological concept of sociometric risk network has therefore been operationalized in spatial demeanour termed as 'spatiometric risk network' and also with other operational terms and meanings that are illustrated else where of the thesis as per pertinence (*vid.* Table 3.1).

3.2.1.2 **Mobility and STD/AIDS**

The theoretical concepts and technical terms that used in STD/AIDS research and action are mostly derived from sociological or epidemiological rim, nevertheless some are directly or indirectly of geography seasoning, and one of such claims is the term 'mobility' which directly entails in the domain of geographical reflections. Note that population mobility causes spatial interaction, hence the concept can be used to analyze the sexual networks between different sex-spaces. Thus the concept has been put to use to know the spatial aspect of the vulnerability of STD/AIDS.

There are important relations between STD/AIDS and migration that make it vital field of research and development. In recent years, heath and migration especially STD/AIDS and mobility has begun to appear as a prominent theme among international agencies and polices (Caram News, June 1997). Confronted by this reality, several research organisations, Universities, NGOs, Networks in Europe, and South and Southeast Asia have already started different research and action activities concerning the relationship of STD/AIDS and mobility. Even in Bangladesh different NGOs have also concerned with the same. One of such international concerns is CARAM-Asia (Co-ordination of Action Research on AIDS and Mobility) comprising seven countries in South and South East Asia with the Vrije University of Amsterdam, which focuses the conditions of mobility that creates potential risk in spreading of STD/AIDS.

But there are some unsolved problem related to the extent of meanings of the term 'mobility'. One of such questions as to types of population movement *i.e.* internal movers or international migrants is not clear at all. In most cases international migrants are in the key focus comparing to the internal and even popularly, mobility makes sense of that incidents where crossing of international boundary are taken place. However, there are other exemplars too. In the government's HIV/AIDS/STDs policy document of Bangladesh, both internal and external migrants are defined under the heading of mobility and STD/AIDS. And especially truckers are shown as the extremely internal mobile group vulnerable to AIDS/STDs (National Policy on HIV/AIDS and STDs Related Issues, 1996).

The another problem in the field of mobility and STD/AIDS is the definition of 'Mobility or Migration' itself. In migration geography, the lack of standard definition of 'a move or form of movements' is itself a non-decipher concerns. Researchers have freely used space, time, and purpose of movement criteria to define a movement related terms which still lack uniform meaning (Mahbub, 1997). The general term 'population mobility or movement' includes all kinds of spatial relocation from routine daily commuting to permanent migration that occur over various distances, and in which the duration of moves varies from a few hours to many years (UN, 1970). It may be take places with change in places of residence permanently or for short period; or without change of residence; or may be for different purposes such as for work, study, recreation, shopping, *etc.* Mahbub (1997) in his book entitled 'Mobility Behaviour of Working People in Bangladesh' endeavoured to differentiate mobility related terminologies used by the different researchers in general and also in the rural perspective of Bangladesh in particular (Mahbub, 1985-86). First, following Zelinsky (1971) he categorised population mobility into 'Migration' that refers to continuous absence for over a certain period of time to permanent change of residence; and

'Circulation' usually meaning variety of movements *viz.* Short-term, repetitive, or cyclical in nature, but must not permanent or long lasting in residence. In other words, these two types sometimes termed as 'linear' and 'non-linear'. Commuting is an important type. This type characterised by regular back and forth journey for work or any purpose. In a case of the study on Bangladesh Mahbub (1997) identified another two: 'Circular Migration' closely related to general term migration and 'Oscillation' or 'Shuttle Movement' that includes frequent movement or daily commuting and non-frequent movement or journeys *e.g.* shopping or visits (Mahbub, 1985-86; 1997). However, as to the extent of meaning and definition of these terminologies, there is plenty of arbitration among the researchers.

Unfortunately, the above terms of population mobility have little use in the study of trucking pattern or truckers' movement. The underling reasons may be of the basic difference between the nature of general mobility and the trucking profession. People moves to find job, work or any things else; changing residence or not; for short period or permanently, but not doing so as profession *i.e.*, not considering mobility or migration as a 'business to move'. Thus the migration researchers used to approach the population mobility in terms of origin-destination, distance, direction, duration and determination or expectation of the movement. All these characteristics can be put to use in the truckers' movement. But the basic difference between trucking and other forms of movement is that trucking is a profession. Trucker moves not to find any job, work or recreation rather moving is tagged here as a job. Hence commuting or oscillation, in contrast to the other forms of mobility though seems to be closer or alternate to the trucking, but not same in terms of nature. Therefore, trucker mobility should approaches from different perspective and new terminology is needed to differentiate it from other forms of population mobility.

In the present research, trucker's movement was considered as a profession and defined accordingly. In other words, it considered as 'Flow Pattern' or very specifically can be termed 'Trip Pattern' or 'Tracking' which refers to spatial mobility of truckers community as of their job or profession and people who doing this so, in other words, move with the truck are called Truckers'. Thus in the present study, trucker mobility are looked in the light of average frequency of business trips, its' distance, direction, duration and timing, transition and O-D metrics *etc.*

3.2.2 The Concept of STD/HIV/AIDS

Sexually transmitted disease (STD) remains a serious public health problem in most parts of the world, particularly in developing countries, where for decades they have ranked among the top five diseases in adults who seek health care services, though the precise level of STD prevalence and incidence are usually unknown (WHO, 1991a). Moreover, the appearance of HIV and the resultant prevalence of AIDS, which is basically a STD with high mortality, have focused even greater attention on the control of sexually transmitted diseases.

STDs: A group of diseases acquired as a result of sexual intercourse with an infected individual or infection in neonates and infants acquired during birth from their infected mother (Taber's Cyclopedic Medical Dictionary, 1993).

At least twenty different STDs have been identified. Whereas some, such as syphilis, are as old as recorded history, other such as AIDS, have only recently been identified. The common STDs are: Syphilis, Gonorrhoea, Lymphogranuloma, Venereum, Chancoid, Granuloma, Inguinale, Chlamydiosis, Pelvic Inflammatory Disease, AIDS, and other conditions such as Trichomoniasis, Genital Candidiasis, Genital Warts, Genital Herps, and Bacterial Vaginities *etc.* (Little, 1991).

The general symptoms that indicate as STD infections include: sores, growths, rashes or blisters on sex organs, the anus, or the mouth; pain or burning during urination; pain during sexual intercourse; swelling or itching in the genital or anal area; unusual discharge from the vagina or penis. Often there will not be any noticeable symptoms in the early stage of disease. Signs of a STD infection may also appear and disappear without any treatment. This does not mean, however, that a spontaneous cure has occurred. Unlike colds and measles, STDs usually do not away without medical attention.

Most STDs can be infected and cured. If not treated, however, serious complications can develop: permanent damage to reproductive organs, blindness, chronic illness, heart disease, a greater risk of cancer or even death. Two STDs remain incurable. One is the herpes, a painful infection. Although herpes symptoms can be treated, there is still no way to prevent the initial infection or stop recurring outbreaks. The second incurable STD is AIDS_ the most threatening of all. In fact AIDS is the final and most serious stage of all STD infections.

All STDs, however, are extremely contagious even if the infected person is free of symptoms. Mostly are spread primarily through the intimate physical contact of sexual activity. Herpes and genital warts, two common STDs, are most often spread through direct exposure to infected skin. Others, such as syphilis, gonorrhoea, chlamydia, can be transmitted through contact with infected blood, vaginal secretions, or semen (a mixture of sperm and fluids secreted by the body especially during the sexual intercourse). It is extremely unlikely if not impossible to contact a STD from a toilet set or a towel or anything else touched by an infected person.

In fact more than half of all cases of STDs occur during adolescence or early adult years (Steeoff, 1990: 69). There are also two groups of people who can be fairly sure they will not get an infection through sexual intimacy. The first includes people who

are celibate. This group does not have sex. The other group is made up uninfected individuals who are monogamous. For this to be an effective defence against STDs, the partner also be uninfected and the monogamous. But among people. who is neither celibate nor monogamous, the risk factor depends on how carefully they select their partners and their choice of sexual activities. Having multiple partners or even having just one partner who is sexually active with other people increase the possibility of exposure to STDs. This can be minimised by learning about these infections, knowing what to ask potential lover, and understanding safer-sex techniques. Having an active sex life that both satisfying and healthy involves issues of choice and responsibility. Stopping the epidemic STDs require to know all the aspect of STDs (Little, 1991).

AIDS: The Final STD: As mentioned earlier that the most threatening of all STDs is AIDS (Acquired Immune Deficiency Syndrome). In fact AIDS is the final and most serious stage of all STD infections. It is a state of contagious defect of the immune system caused by a virus (HIV) and similar to other STDs spread by contaminated blood, sexual contact, or nutritive fluids passed from a mother to fetus; leaves people vulnerable to infections and certain types of cancer and almost always fatal (Check, 1988).

There exist a strong co-relation between the presence of STDs and spread of HIV. Both ulcerative and non-ulcerative STDs increase the risk of sexually transmission of HIV. Presence of any STD makes it easier for the virus to pass from one person to the others. HIV infected a person or gets inside body of a person through breach or discontinuity in the outer surface of the skin/mucus membrane. Carried in body fluids, HIV enters one's body more easily through genital ulcers. Thus different STDs increase the risk of transmission by 2-9 times (GOB, 1997). However, AIDS itself a STD and

hence both the terms STDs and AIDS including the virus that thought to be caused AIDS are written and addressed synchronously simply putting oblique sign (/).

The Advent of HIV/AIDS & Revive of STD: It is now clear that there is a very strong correlation between the spread of conventional STDs and HIV transmission. In a WHO consensus statement showed correlation between HIV and the agent of conventional sexually transmitted diseases that:

- The predominant mode of transmission of both HIV and other STD agents is sexual, although routes of transmission for both include blood, blood products, donated organs or tissue, and through an infected woman to her fetus or new-born infant.
- Many of the measures of preventing the sexual transmission of HIV and other STD agents are the same, as are the target audiences for these interventions.
- STD clinical services are an important access point for people at high risk of contracting both AIDS and other STDs, not only for diagnosis and treatment but also for prevention education.
- There is a strong association between the occurrence of HIV infection and the presence of certain STDs, making early diagnosis and effective treatment of such STDs an important strategy for the prevention of HIV transmission.
- Trends in STD incidence and prevalence can be useful early indicators of changes in sexual behaviors and are easier to monitor than in HIV seroprevalence.

Source: *WHO Consensus Statement on Global Strategies for Co-ordination of AIDS and STD Control Programs, Document WHO/GPA/INF/90.2, July 1990.*

Because of this correlation, primary prevention activities aimed at changing sexual behaviors in order to reduce the spread of conventional STDs and also have potential to limit the transmission of HIV. In addition, there is increasing evidence that certain untreated STD, particularly those causing genital ulceration, can significantly facilitate both the acquisition and subsequent further transmission of HIV. Consequently, the control of STDs through early diagnosis and treatment is another vitally important control measure that would directly reduce the spread of HIV (WHO. 1991a). Even the growing recognition of the true extent of the interrelationship between conventional STDs and HIV led to a re-evaluation of all STD-related WHO activities. In the lead up to this process several WHO consensus statement on global strategies for co-ordination of AIDS and STD control programmes were produced, where recommended the close co-ordination and if possible, the combining AIDS and STD control programmes at national or local level, even requested a review of the strategic issues and organisational implications of both control programmes (WHO, 1990a; WHO, 1991b).

3.2.3 The Concept of Sexuality

The term `Sexuality' usually refers to sex *i.e.*. state of having sex. In reality sexuality is much more than sex. In a sense, all humans are sexual beings from infancy (Rodgers, 1988). There is immense variety in the ways by which sexual arousal and pleasure occurs. Different people choose different ways to express their sexuality. Ruth Bell (1988) defines true sexuality as: "Being sexual can mean having sexy thoughts or feelings, loving to be touched, enjoying the way other people's bodies look, touching your body in places that feel particularly good, making up romantic or sexy stories in your head that you might or might not ever act out, kissing and touching someone you feel attracted to... Sexuality is much fuller and more varied than just lovemaking... Our

bodies alive to sexual feelings" (Bell, 1988). Almost similar way medical dictionaries explain sexuality. According to Taber's Cyclopedic Medical Dictionary, sexuality connotes many things *e.g.* " the collective characteristics that make the difference between male and female; State of having sex; constitution and life of individual as related to sex; all the dispositions related to the love-life whether associated with sex organs or not" (Taber's Cyclopedic Medical Dictionary, 1993). Another medical dictionary pointed out the sexuality as " the sum of a person's sexual behaviors and tendencies; and the strength of sexual tendencies; the quality of having sexual functions or implications" (Stedman's Medical Dictionary, 1982).

All the mentioned definitions epitomised a substantial periphery of sexuality. But in the present study sexuality was not consider from spacious point of view, rather contemplated state of having sex and behaviors connecting to pre-marital or extra-marital sex with the fiancées or commercial sex workers (CSWs) other than wife (ves) or socially recognised single partners.

3.2.4 Theoretical Structure of Socio-economic Characteristics

Researchers in all spheres, other than the extreme physical sciences, frequently use the phrase 'Socio-economic Characteristics', which is in fact obscure in meaning, infinitive and indistinct in use. Although the phrase was born in the paunch of sociology, researchers of different fields and from world organisations to individual one freely exploit it as per their needs, orientation and direction. No body knows what are the clear-cut attributes or variables that make the head_ 'Socio-economic Characteristics'. Similarly no concrete theoretical conceptual structure of the same is yet comprehended. Even in case of same purpose, different structures were developed. The World Bank socio-economic indicators are not alike that of UN structures (*cf.* UNESCO, 1976; World Bank, 1977). Medical personnel, public health

experts, epidemiologist and other health scientists consider the phrase in regards to the background of the study subject. In the present study, however, as it belongs to the similar nature, socio-economic characteristics of the sample subjects were also explored, but to that extend as needed for the research. These were as follows.

- **Demographic:** population number, age structure, religion, gender, marital status, origin and migration, family size and type *etc.*;
- **Social:** literacy and education, housing, living status, means of recreation and communication *etc.*;
- **Economic:** Job experience, working environs, training, income, expenditure, savings, credit, *etc.*;

3.2.5 Theoretical Structure KAP/KBP and HRB

Similarly, no definite or formal structure concerning so called KAP/KABP survey was found in epidemiological literatures. However, there are some common points or issues that usually dealt under the head of KAP/KABP. In the present study, the phrase was coined in regards to the background of the study subjects and explored to that extend as needed for the study. Then, the structure the KABP was defined as follows.

K = **Knowledge** of the nature of STD, its mode of transmission, and preventive measures; knowledge of safer sex and correct use of condom *etc.*

A = **Attitude** towards sex and visit to CSWs, alcoholism and other substances or drug abuses, condom use *etc.*

B = **Belief,** popular conceptions and misconceptions in relation to STD/AIDS *etc.*

P = **Practice** of pre- or extra-marital sex, habit of condom use, addiction of drug or substances, shaving practice *etc.*

High Risk Behaviors (HRB): Sexual orientation, Multiple sex partners, pre-marital sex, extra-marital sex, not using condom, homosexual sex (MHM), oral sex, anal sex with women, IVD uses/sharing needle, regular use common saloon/razor. In fact these issues are related to knowledge, attitude, practice, and actual behaviors of the subject. However, these behaviors are said to be rootstock of being infected with STD/AIDS. These behaviors indecently or jointly make a person vulnerable to STD/AIDS, hence termed as high-risk behaviors.

3.2.6 The People around the Trucking Industry

As mentioned else where in this thesis that surprisingly, no write-up material in any form or kind was found on trucker community in Bangladesh. But to know about STD/AIDS aspects among this group, it was needed to know details about the profession and the people. So that first, the community called truckers could be defined and second, the professional linkages of truckers with other groups *viz.* pressure or peer groups and their influences as well as other job hazards could be established. Keeping this in mind travelling along the major truck routes and stands, participatory observation, interviewing with key-informants, informal discussion and other qualitative techniques were made before starting formal research. The following is a short outcome of the reconnaissance (a list of names and addresses of key- informants has been given in the appendix).

A truck is an important heavy motorized vehicle engaged in transporting goods and commodities over to the country. It is as important for society as the blood vessels for the survival of the life. It carries necessary goods every where and as a result connects the whole country. Similarly the man with truck, as belongs to high-risk behaviors, could have been transported deadly disease like STDs and AIDS.

This is why recently especially after advent of AIDS truckers have come into the attention of the public health experts and decision-makers.

According to the government statistics, there are about 40,000 trucks in the country. All the trucks are labeled as heavy vehicle though varies in capacity ranging from at the lowest 1½ tons to 3 tons, 5 tons, and 7 tons at the best. However, only 5 to 7 tons capacitated trucks are moving across the country. While, the Jamuna Bridge authority put a billboard on its entrance gate to demonstrate the fair-chart of different vehicles, where the trucks are categorised as: light (small size), medium and large size. (The Daily Janakentha, 26 May 1998)[4]. Each truck must have a valid registration, route permit, and fitness certificate, test token, insurance, *etc.* from proper authority. However Bangladesh Road Transport Authority (BRTA) is the concern.

A truck moves from a starting point or in other word, each has an address. Trucks move on a certain route in which there is a starting and ending points as well as some midway stopovers. These are publicly known as 'Truck Stand'. These truck nodes are divers in nature, size, and status. Some are of nationally important and big in size; some are at district level; and other are smaller with few trucks. The top of the rank is called 'Truck Terminal' characterized by large number of standing trucks, union office, workshops, transport agencies' office *etc.* The terminals are built on government land and have formal authorization. There are two small truck terminals in the country. Both are small in size and located in Dhaka City: one at Dayyagonj with capacity of 200 trucks and another at Bagbari, Mirpur with capacity of 400 trucks. These terminals are under the control of Dhaka City Corporation (DCC) and properly developed with basic the requirements of truckers movement such as having parking places, rest room, union office, toilet and sanitation facilities *etc.* But there is no national truck terminal at all. While there are several large bus terminals in Dhaka City, of these Gabtali is developed for both truck and bus. An initiative to establish a national truck

stand at Aminbazar of Dhaka was taken by the former government in 1988, and was desolated immediately after dropping the government in 1990. The medium sized are called 'Truck Stand' in which presence of a good number of trucks and a branch office are found to be common, usually located at the periphery of district towns, near at ports or different nodal parts of metropolitan areas. These may have been formally authorized or not, however, all are informally recognized. Presently a number of 10 truck-stands in Dhaka City and nearly all districts towns have one, even somewhere more. Thus in total, approximately 130 stands were estimated in the country. The last and the smallest ones can be termed as 'Truck Stoppage'. These are illegal and temporary stands that frequently grown up on important roadside and police illegally charges TK. 100-200 per truck/day against parking here in these spots. However, there are also some stopovers and parking lot in different ferry *ghat*, port *etc.* Note that there is no clear-cut definition or classification of truck stands in practice. Thus the above classification should consider merely an inaugural endeavor.

A substantial number of people associated directly or indirectly with the trucking industry. These people are: truck owner, driver, helper or assistant, union leader and activist, *mystree* and technicians, painters, transport agencies, clients and parties, customs and law enforcement agencies, *ghat* authority and workers, *etc.* However, truck driver and helper are in the core compare to the others. They are directly involved in trucking goods and have to move with the truck. Thus these two groups can be designated as 'Truckers'. In fact, helpers are nothing but trainer and prospective drivers. The licensing system of BRTA indicates that a truck driver must be with HTV license. In usual cases, a fresh young aged 15 to 20 years started as helper or assistant to the driver. After completion of continuous 6 months to 2 years training period, he becomes a driver. Then he has to apply for ordinary driving license, next for HTV license and subsequently he turns to be a matured driver. This process seizes

frequently up to 10 years, even sometimes more. Thus truck drivers, especially those are playing inter-district trips, were found to be of certain age group.

Figure 3.4 illustrates the relative location and relationship of the people around trucking industry. It is evident that the owners of the truck, union office bearers, traffic polices, port and *ghat* authority, custom and other formal or informal tool collectors, transport agencies and parties are though closer to trucking business, but usually are playing pressure role, even sometimes create job hazards for the truckers that persuade them towards irregularities like taking excessive alcohol and having sex with CSWs. While in the contrary, some other groups in the periphery those are not any way concerned with trucking industry, but somehow related to truckers are defined here as 'Peer Group'. These are CSWs and other brothel-personnel *e.g. sardarims*, pimps, *dalals etc.*; local-wine salers and *kabiraz*; boarding boy; *ghat*-workers *etc.* These peoples are peer to truckers and play important role in developing sex and other risk networking. Thus for any intervention to reduce or prevent STD/AIDS among the truckers, all of these people around the trucking industry are to be involved for achieving better return.

Figure 3.4 *People around the trucking industry*

The truckers are likely to be the most organized community in the country. There are two nation-wide truckers union namely 'Bangladesh Truck Drivers Union' based at Tejgaon, Dhaka and 'Inter-district Truck Drivers Union' based at Shaymolee, Dhaka. Each union has nearly 200 branches around the country. The former one is the oldest and has 31,000 members. The later blessed with 17,000 members. These two unions disunite the truckers into two vying groups. Nevertheless, both the unions have recently been unionizing under an umbrella organization namely Bangladesh Truck Chalok-Sramik Federation. Being a member of either union is said to be mandatory for all HTV license-holder drivers. But in practice there are huge number of truckers still outside the both unions, especially ordinary drivers and helpers. Though there is an independent organization for ordinary truck drivers, but no such organization have seen for truck assistant or helper community. Officially, unions are responsible for the betterment of the truckers, but opposite in practice. Both are found to be playing least role for community interests rather appeared to be more exploiting and political in nature. Even none of the high level office-bearers of both unions have found currently to be engaged in trucking profession. Besides, the present researcher met with some 'Big-bosses' of both unions, whose had never been in the trucking line. Rather they are 'professional leader' and directly involved with different political parties of the country. These people are indeed more powerful than those actually representing the trucker community are. Each driver has to pay TK. 120-150 to the central office and TK.1800-2000 to the branch office of their respective union as annual subscription and other fee and also TK. 30 for group insurance. Other than this regular dues there are various forms of tolls collected forcedly from ordinary drivers. To do this illegal business each branch has some muscleman-activists. The researcher himself is an eyewitness of one of such instances.

Table 3.2 **Some Information on Truckers and Trucking Industry**

Items	Data	Sources
Total no. of truck in the country	34,936	BBS. 1997
Estimated no. of trucks on road	40,000	Estimated
Types of Truck	1½, 3, 5, 7 tons.	Key informants
Number of truck stands in the country	130	Key informants
Number of truck terminals	2	Key informants
Major Truck bases in the country	6	Key informants
Major routes (Dhaka-based)	6	Key informants
No. total truckers in the country	130,000	Estimated
No. truck drivers (all)	80,000	Estimated
No. of long-distance drivers	24,000	Estimated
No. Helpers	50,000	Estimated
Truckers organizations: (1 Federation + 2 unions)	3	Union office
Bangladesh Truck Chalok-Sramik Federation	1	Union office
No. of drivers unions	2	Key informants
Members of Bangladesh Truck Drivers Union	31,000	Union office
Members of Inter-district Truck Drivers Union	17,000	Union office
Branches of Bangladesh Truck Drivers Union	147	Union office
Branches of Inter-district Truck Drivers Union	200	Union office
No. of helpers union	None	Union office
No. of truck owners association	1	Association

Source: *Organisational and Qualitative survey. 1997*

3.3 Operational Definitions

Drawing the above theoretical and conceptual discussion it seems reasonable to place some operational definitions as the basis of the present thesis. These are as followings.

- **Truckers:** People, who are directly involved in trucking goods and have to move with the truck, *e.g.* truck drivers and helpers.
- **Long-distance Driver:** Those are predominantly engaged in inter-district transportation.
- **STDs:** A group of diseases acquired as a result of sexual intercourse with an infected individual or infection in neonates and infants acquired during birth from their infected mother.
- **Sexuality:** State of having sex and behaviors connecting to pre-marital or extra-marital sex with the fiancées or commercial sex workers.
- **Truckers' mobility:** Trucking is profession. Trucker moves not to find any job, work or recreation, rather moving here denotes to a job. In other words, it considered as `Flow Pattern' or very specifically can be termed 'Trip Pattern' or 'Tracking' that refers to spatial mobility of trucker community as of their job or profession. Thus in the present study, trucker mobility are looked in the light of frequency of business trips, its' distance, direction, duration, transition *etc.*
- **Sex-space:** refer to certain locations or places used for commercial sexual activities. This space sometimes may be *hidden e.g.* parks, hotels *etc.* used by the floating CSWs; or may be exposed or *institutionalised e.g.* formal brothels.
- **Vulnerability to STD/AIDS:** refers to the high-risk behaviors, especially sexual risk behaviors. Since these behaviors are said to be rootstock of being infected with

STD/AIDS or in other words, these behaviors independently or jointly make a person vulnerable to STD/AIDS.

- **STD-Core:** refers to that places as perceived by the victims suspecting to be the origin of their respective incident of STD.
- **High Risk Behaviors:** behaviors that suspected to be the rootstock of being infected with STDs, *e.g.* heterosexuality.
- **Socio-economic Characteristics:** Some of the widely used demographic, social and economic indicators are labelled as 'Socio-economic Characteristics'.
- **Spatiometric Risk Network:** meaning sexual linkage between different sex-spaces through the clients.

3.4 Conceptual Frame of the Research

In conclusion, with the help of the above theoretical discussion, a conceptual frame for the present study was drawn as an end output. Figure 3.6 shows the frame in which the variables and its inter-relationships are seen and these had been studied at different levels. At background level several sociological, epidemiological and spatial characteristics of the subjects such as socio-economic, high-risk behaviors, and spatial mobility behaviors were investigated.

The second and third levels of study were the ultimate focus of the present research. These levels involved with the following tasks_ **first,** to convert some epidemiological concepts of sexuality and STD into spatial identity and frame; **second**, to explore this new form of data and analysing them with several spatial techniques, so that some new insights can be drawn on STD/AIDS research and development. **Finally**, geographical determinants of vulnerability were also searched and on the basis of the above findings spatial strategies for STD/AIDS interventions suggested.

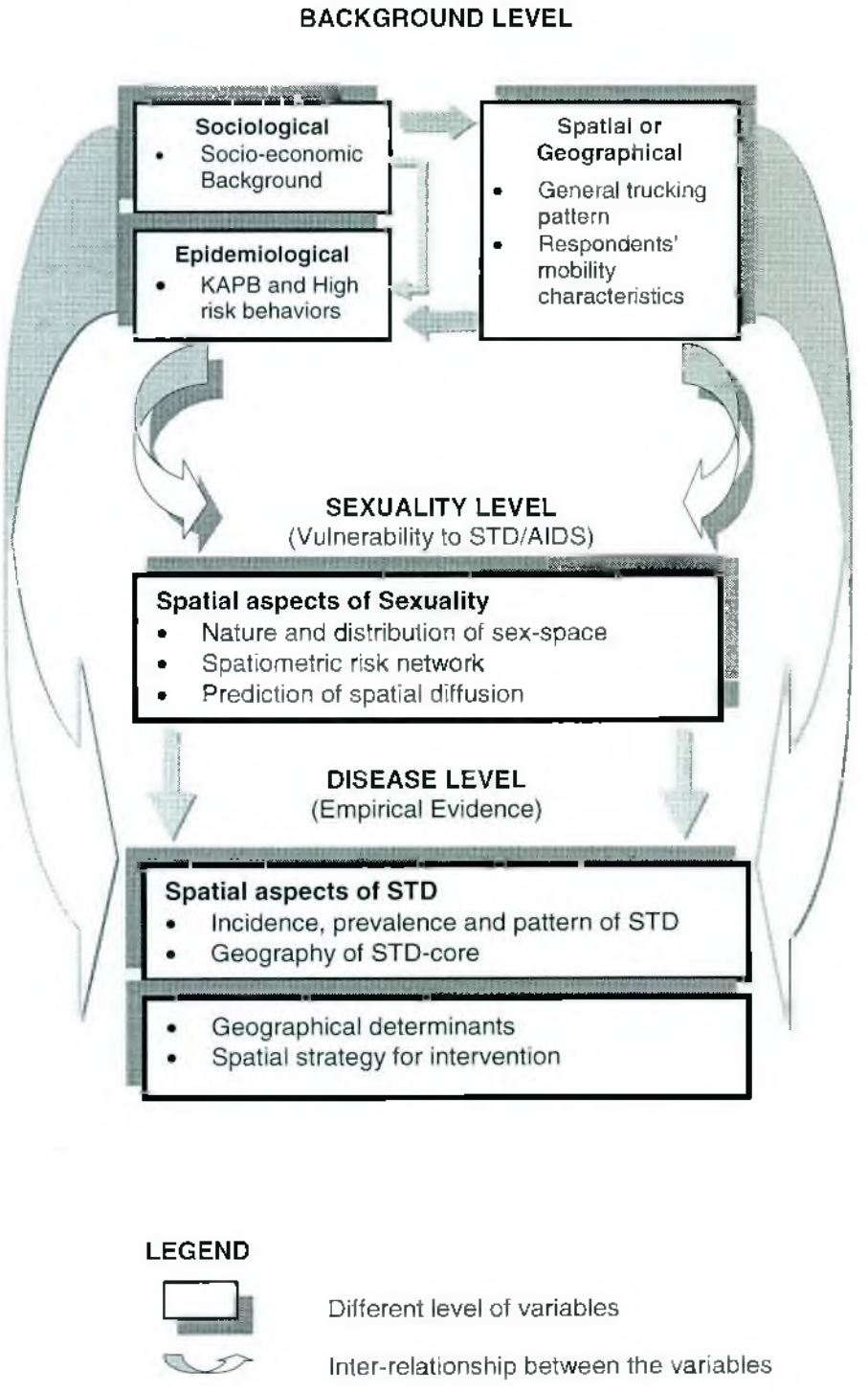
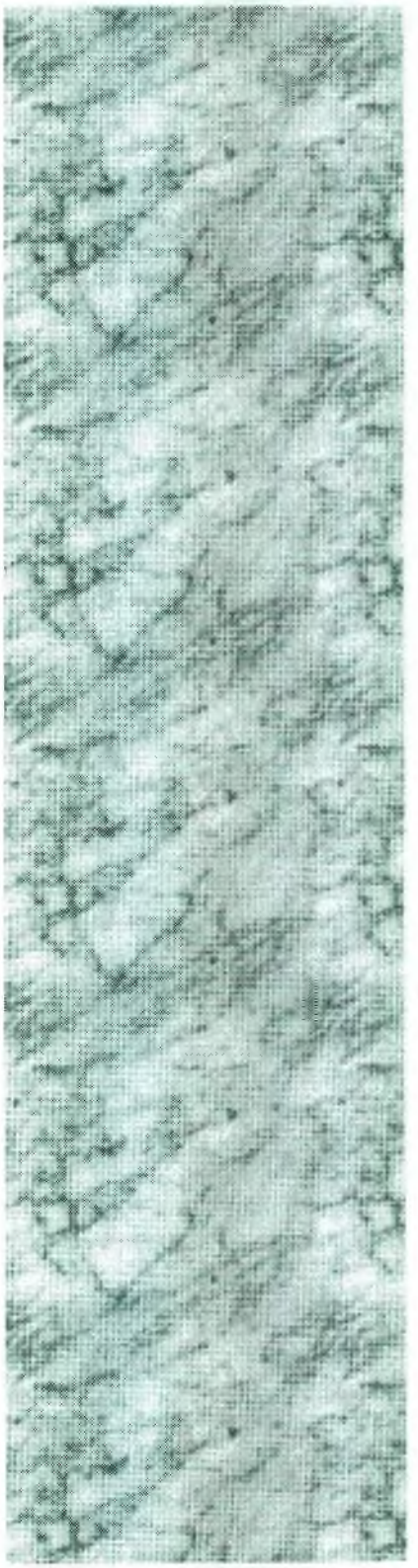


Figure 3.6 *Diagrammatic presentation of the conceptual frame of the research*

Chapter 4

BACKGROUND OF THE RESPONDENTS



4.1 Introduction

This chapter has three sections *viz.* section-1 on ' Demographic, and Socio-economic, Background of the respondents'; section-2 on ' KABP and High Risk behaviors of the Respondents'; and section-3 on 'Mobility Behaviors: Trucking Pattern of the Respondents'. The chapter, however, abridges several sociological, epidemiological, and geographical backgrounds of the respondents as independent variables. The end of chapter concludes the cross-sectional properties of these background characteristics.

4.2 Demographic and Socio-economic Characteristics

The one of the most important objectives of the present research is to focus on various demographic and socio-economic aspects of the trucker community in Bangladesh. The characteristics are taken as the background statistics of the respondents, *i.e.* the independent variables. The conceptual shape of these characteristics is discussed in the Chapter 3 and accordingly this section scrutinized the respondents' demographic, social, and economic profiles respectively and in details.

4.2.1 Demographic Features

As mentioned earlier that the truckers are the key as well as the most numerous group amongst the people around the trucking industry (*Vid.* Chapter 3: Figure 3.5). They are also the most numerous segment among the transport workers especially among the organised road transport sector in Bangladesh (BBS, 1997). Note that organised road transport includes Bus, Mini-bus, Microbus, Jeep, Car, Truck *etc.* (Statistical Yearbook of Bangladesh, BBS, 1997, p. 276)[5]. Nobody knows how many truckers in Bangladesh. It is implied that any type of vehicle is required to have a valid

license from the proper authority for playing on the road and at the same time a driving license is must for the man behind the steering, let alone truck drivers. The licensing system of BRTA indicates that a truck driver must be with HTV license, since the trucks, whatever the size_ heavy, medium, smaller_ are categorised as heavy motorised vehicle (discussion with a BRTA high official, 1997)[6]. Hence it is expected that at least the figure of total truck drivers should be available in the government statistics. But the fact remains that **first**, due to the stupid complexity of bureaucracy makes heard to reach the BRTA data, so to say, it is rather easier to have the moon in hand, especially for those ordinary people like the present researcher. **Second**, BRTA data are neither reliable nor enough for in contrast to the other sources or in context to the reality. Some of the evidences now seem to be important for justifying the above statement. As to the question of trustworthy, government statistics can be inserted. Such as BBS, for instance, based on the BRTA records showed the number of registered trucks is 45,905 around the country and 1974 in Dhaka metropolitan area in the year of 1995. But in the same year the estimated number of trucks on road had shown as 34,936 (BBS, 1997: 280 / 282). While in contrast to this statistics published in both the Statistical Yearbook, and the Statistical Pocketbook of the same organisation produced different figure in different meaning, *e.g.* the number of trucks on road in 1996 is shown as 40325 (BBS, 1997). Whether this figure is estimated or based on registration records was not mentioned, but most likely estimated, and if so, the figure is clearly different than the above. Finally, in a parliamentary session, the Minster of Communication and Transport Mr. Anowar Hossain affirmed the true figure of the number of registered trucks was 36,136 until June 1997 (*Daily Janakantha*, 14 April 1998)[7]. On the other hand, as to the number of truckers in Bangladesh, no direct statistics was found in the government records. While in the non-government sources two different records were found, One from Care, Bangladesh, an international NGO, quoted in a report that the

total number of truck drivers in Bangladesh is around one *Lakh* (100 Thousands) (CARE, 1997). While another local NGO working on trucker community estimated nearly 50,000 truck drivers and 35,000 helpers (CEDAR, 1995).

However, the present researcher also attempted to project the approximate figure. Discussing with the key personnel of the truckers union as well as considering the above government statistics, the number of trucks actually playing on road was estimated around 40, 000. It was seen that each truck has two alternative drivers on average, and has at least one full-time helper or assistant of each, plus one extra for every ten truck as 'standby'. Thus a total of 80,000 truck drivers and 50,000 (full-time 40,000 + standby 10,000 = 50,000) helpers in Bangladesh.

Apparently trucking is an irrefutable job. Thus certain age-range, enough training and experiences are needed to be a license-holder. In usual cases, a fresh young aged 15 to 20 years started as helper or assistant to the driver. After completion of continuous 6 months to 2 years training period, one becomes a driver. Then he has to apply for ordinary driving license, next HTV license and subsequently he turns to be a matured driver. This process seizes frequently up to 10 years, even sometimes much more. Thus truck drivers, especially those are playing inter-district trips, were found to be of certain age group. The data showed that the overwhelming majority of respondents were of 30-50 years age level (more than 80 %) and none was found below 20 years and a very few were above 60 years. More than 90% of the sample truck drivers were married and most of them got married between 21-25 years age. 'Be a driver before marriage'_ is popular saying among the trucker community. A single case was found separated and a few had double wives. None of the truckers were reported to be female. Except one case all the respondents were Muslim. It was also estimated from the unions' roster that hardly a total of 400 Hindu drivers in Bangladesh. However, religion is less important factor among the truckers. None of the samples

were used to in basic religious practices. Nevertheless, interestingly they all, even the Hindu one too, had shown peculiar faith in some religious legends, places like *Mazar/Darbar Sharif* and holy-men like *Pir, Fakir etc.* This is most seemingly the sign of their subconscious fear towards road accidents and other irritations that they have to meet frequently on the way. Nearly all were migrated from rural areas, especially from various parts of the old districts of Barisal, Noakhali, and Comilla. Notice that in most cases origin district of the owner and the driver is same. Surprisingly, some of the respondents said to the researcher that they had enjoyed one more chances to cross the Indo-Bangladesh border without passport-visa through several transit points *viz.* Hili, Banglabanda *etc.* and visited Indian brothels. It is needed to note here that both Indian and Bangladeshi truckers have the legal access to some extend into each other country at several land-ports for loading/unloading import/export goods. India brothels are is one of fast growing STD/AIDS epicentre in the present world (WHO, 1991, Choudhury, 1998). Thus the administrators and policy-makers of public health sector in Bangladesh should keep this fact into their mind.

4.2.2 **Economic Profile**

Trucking is a formal profession. As mentioned earlier that for being a truck driver one had to pass through some formal processes and long experience is needed especially to be an inter-district driver. Surprisingly, though most of them had more than enough experiences in trucking line, but none amongst the sample found to have formal training. A typical tradition of *Ostad-Sarged* (Mentor-pupil) learning system is prevailing here. The driver as *Ostad*, is responsible to train his assistant or helper, the *Sarged*. In general cases, *Sarged(s)* are relative or countryman, or any way known to the *Ostad*(s). The assistants are full-time employee and get regular salary from the owner. They get TK. 2000-3000 *per* month with TK. 30-50 as '*Khoraki*' (daily food

allowance). On the other hand, drivers' are usually employed on trip-contact basis and hence a few drivers can work round the year. On average they had 6-8 months works in a year. However, drivers' earnings in contrast to Bangladesh are by no means indigent. The salary range varies according to the truck size and trip pattern. Those who drive 3 tons or below capacitated truck usually get TK.1000-3000 as monthly salary, plus TK. 50-80 for *Khoraki*, but those engage in heavy truck like 5 tons or above and made inter-district trips were given monthly salary of TK. 3000-5000 excluding daily allowance of TK. 100. Moreover, they get a lump sum commissions from transport agency and tips from concerned parties. Even a good amount is earned in each month by adopting irregular means e. g. from black selling of fuel or from off-trips. Thus in total an earnings of TK. 8,000-15,000 in a month was common among the inter-district drivers, even earnings of TK. 18,000 was also found. This amount is parallel to those of upper-middle to even near to the lower-upper income group in Dhaka (For details of Income groups in Dhaka city: N. Islam, Dhaka: From City to Megacity, USP, Dhaka City, 1996. p. 95)[8], the capital city of Bangladesh. But it does not suggest that the truckers are fall into the high-income group. Rather, sociologically they may be categorised as the lower to hardly middle-middle social class. Their living standard, expenditure pattern, and overall social characteristics *etc.* emphasise this fact. Although most of them were living in substandard messes or in poor houses of the city, the amount of total expenses and pattern of expenditure deemed to be high and peculiar. The data showed that most of them had expenditure between TK. 6,000-10,000 *per* month and of the total 40-60 *per cent* spent on personal-cost head. Moreover most are burdened with big family. However, by calculation TK. 2,000-5,000 should be saved. But the savings were utilised during the days of the off-season and eventually savings comes down to nothing at the end of year. Some of the respondents disclosed that even they very often depend on loan from other fellow drivers for survival. One

respondent opined that only driver saves driver's life. Nevertheless, it was also come out from the discussion with the respondents that a good number of the drivers have become owner and very rich-man through trucking profession.

4.2.3 Social Dimension

The social status of the truck drivers, as a whole, was not found to be corresponding to that of economic contour. So to speak, they rather represent the low to middle-middle income social group in Dhaka city (For details of the social classes in Dhaka city: K. Siddiqui *et al.*, 1992)". First, their educational background underscores the fact. As evident in the Table 4.1 that more than 90 *per cent* were literate, but a very few studied up to the grade of S.S.C. and no one found to be completed H.S.C. Most of them (nearly 70 %), however, received some paces of primary education. Even though their housing quality was not as worse as slums and squatters but not as so as expected. Most of them were living in substandard housing like messes without families or in poor houses with their families. However, whether they living with or without family, they have to live near to owners' the resident or near to the work place *i.e.* the origin place of the truck (O).

They do not have enough sources of recreation. They pass their time simply by gossiping in groups, listening song, playing cards *etc.* Most of the respondent drivers read newspaper, or being informed about everyday affairs from discussion with peers. As for electronic media, listening to radio is more common than watching television. Some of the respondents considered of taking alcohol or going to women for commercial sex as recreation. In a report quoted an elderly member's opinion that adequate sources of healthy recreation for the truck professionals especially at transit points like Aricha could keep them away from drug, wine, and women (CEDAR, 1995).

Table 4.1 **Demographic and Socio-economic Characteristics of the Respondents**

Variables	Variable Classes or Intervals	*f* & % of the Total Samples	
DEMOGRAPHIC ATTRIBUTES			
Age structure *(years)*	Class	*f*	%
	< 20	00	0.0
	20-29	29	12.08
	30-39	129	53.76
	40-59	69	28.75
	50-59	11	4.58
	60 +	02	0.83
Marital status	Never married	15	6.25
	Married	224	93.33
	Separated	01	0.42
	Double wives	05	2.08 *
Place of origin	Rural areas	236	98.33
	Town / city	04	1.67
Place of origin *(old grater districts)*	Barisai	84	35.00
	Noakhali	77	32.08
	Comilla	46	19.17
	Other districts	33	13.75
International migration	Visited India	04	1.67
	Other countries	00	0.0
Religion	Muslim	239	99.58
	Hindu	Single Case	0.42
Gender			100% Male
Living with family in 'O'	Living with family at present address	51	21.25
	Living without family	189	78.75
Family size	Self only	Single Case	0.42
	< 5	73	30.41
	> 5	166	69.17
Family types	Nuclear	89	37.08
	Joint/Extended	151	62.92

** This figure will be subtracted from the total, since it has already been counted with the married figure.*

Table 4.1 Continued...

Table 4.1 Continuation

ECONOMIC PROFILE			
Skill & Training	Formal/Institutional	00	0.0
	Non-formal/traditional	240	100
Trucking experience *(in year)*	< 10 Years	35	14.58
	10 – 20 Years	183	76.25
	> 20 Years	22	9.17
Income *(in TK. per month)*	< 5,000	11	4.58
	5,000 -10,000	136	56.67
	10,000-15,000	84	35
	15,000 +	09	3.75
Expenditure *(in TK. per month)*	< 5,000	43	17.92
	5,000 -10,000	187	77.91
	10,000 -15,000	10	4.17
	15,000 +	00	00
Savings	Eventually nothing at the end of year for most cases.		
SOCIAL ASPECTS			
Education	Illiterate	20	8.34
	Can read only	24	10.00
	Can read & write	39	16.25
	Primary level	82	34.16
	Class VI-X	57	23.75
	SSC passed	18	7.50
	HSC passed	00	0.0
Housing	Messes/garage/union office	173	72.08
	Substandard housing	55	22.92
	At owner's arrangement	12	5.00
Means of communication *(multiple responses)*	Newspaper and magazine	74	30.84
	Radio and Television	142	59.17
	Through peers	219	91.25
Means of recreation	Gossiping and playing card	240	100
	Listening to Radio and song	168	70.00
	Watching Television	48	20.00
	Watching films	96	40.00
	Commercial sex	209	87.08
(multiple responses)	Taking alcohol (*Bangla*)	131	54.58

Source: *Questionnaire Survey, 1997* *N = 240*

4.3 KABP and High Risk Behaviors of the Respondents

'KAP Survey' or often termed as 'KABP' is an acronyms frequently uses in epidemiological studies, meaning that 'K' for Knowledge, 'A' for Attitudes, 'B' for Beliefs, 'P' for Practices. Note that knowledge, attitude, and beliefs are the background factors of risk practices, which altogether said to be the rootstock of being infected with STD/AIDS. Thus these are often termed as 'High Risk Behavior' (details in Chapter 3) and hence important to know. This section, however, outlines some qualitative statements on KABP of the respondents as background statistics of the respondents and summarized the high-risk behaviors with quantitative values.

4.3.1 Knowledge, Attitude, Beliefs and Practices

The question as to the awareness of diseases that could be transmitted through sexual behaviors was asked to the respondents. They were quite familiar with sexual transmitted diseases as they often suffered from that. All the respondents able to naming the most common STDs like syphilis and gonorrhoea. A few also mentioned skin diseases, but no one indicated AIDS as a sexual disease. Even only a few respondent truck drivers ever heard AIDS. Amongst those who know about AIDS, there exist various misconceptions. Most of them believed that AIDS is a 'foreigners disease' and no chance to be transmitted among the Bangladeshi peoples until one goes to abroad. Some other conceptions are like that only having sex with animals or being homosexual (men having sex with men) are the reasons to be of AIDS infected, while some others thought that AIDS is a 'rich man disease'. However, no one found to be correctly aware of the nature and mode transmission and preventive measures of AIDS, even as to the preventive measures of other common STDs as well.

A sense of social and cultural alienation and apathy was found to be prevailing among the whole community in general. They all are more or less worried

about their distorted social image as 'killer', which gives rise to job dissatisfaction and irregularities in lifestyle. Although they were quite aware of the danger of visiting brothel, but their attitude seem to be somewhat fatalistic and little care about whether the CSWs were passing any disease to them. The attitude towards condom is very negative. Condoms, according to them, hinder the attainment of complete sexual pleasure. The general reaction in the community towards drug addiction is negative.

They have some interesting ideas and beliefs regarding STD transmission and prevention. One of such ideas is that if one washes his private parts (genitalia) with antiseptics or soap, then no chance of being infected. They commonly believed that immaculate sex girls are safe as they clean themselves after each contact. Another misconceptions regarding prevention is that of washing genitalia with own urine after copulation keep one protected from acquiring diseases. Similar funny conception is related to avoid infections in which trucker clients used lemon juice and applied it on the vagina for identifying infected girls. Some respondents suggested to chose known and experienced or teenaged sex worker for safety and it was evident that most of the truckers usually had a proverbial sex partner in certain brothels.

4.3.2 High Risk Practices: Addictions

The most phenomenal sign of trucker community is the addiction of various substances. 'Truckers are drunkards' is a public conception in the society. The alcoholism found to be at large practice among them. Some type of local wine known as *Bangla*, (fermented rice juice or country liquor) is very popular among the truck drivers. None of the respondents denied the experience of drinking firewater at least once in their lifetime. Rather they freely acknowledged that some limit of drinking apparently helps in smooth and long driving. *Tari* (fermented palm juice) also a well known drinks. Usually incidence of having drunks happens while they were at rest on

the way and were consumed in group settings. But a small numbers found to have drinks strongly as well as regularly. Only a very small fraction of truckers seldom took drug like smoking *ganja* (marijuana), *afim* (opium), *Charras*, sedative pills, anti-tussive drugs (Phensedyl), and heroin *etc.* but none of the participants acknowledged themselves as intravenous drug users (IVDUs: *e.g.* pathidine). Even the general reaction in the community towards drug addiction is negative.

4.3.3 High Risk Practices: Not Using Condom

The respondents, who are sexually active, were asked whether they had ever seen condom. All the respondents said that they had. But surprisingly for the purpose to protect themselves from STDs, the number of users was very low, only one-tenth of the total and none did not do so on every occasion. Even using condoms being a means to avoid unwanted pregnancy was found to be very unpopular. However, the overall attitude towards condom is very negative. Condoms, according to them, hinder the attainment of complete sexual pleasure. Those who had used condoms, did not use in each sexual contact, to them, they did so in case of obligation imposed by the chosen CSWs (Table 4.2). But in usual cases they are not used to use condom, even they do not know how to use condom correctly; they do not care about whether the sex workers are passing any diseases to them (Discussion with the STD Counsellor at *CEDAR Sheba Kendra*, Aricha; Khan, 1996; CEDAR, 1995) [iii].

4.3.4 High Risk Practices: Shaving Habit

None of the respondent was found to use individual razor regularly for shaving purpose (Table 4.2). They freely disclosed that they are not habituated in shaving at home. Rather they use common saloons, of which mostly are footpaths based or low standard. Even they were not cognisant about risk of such practice. In fact the very

nature of their job, social background and personality may have been the potential factors behind this practice.

4.3.5 High Risk Practices: Sexual Pattern and Behaviors

The issue of sexuality is seldom openly dealt within a traditional conservative society like Bangladesh. Social and cultural taboos prohibit or make difficult to, even initiate discussions on the subject. It becomes still more difficult when the discussions are held with unmarried persons. The study inquired about the risks of exposure of the respondent to sexual experiences in the survey. The specific questions were to determine the levels of direct personal experience of the respondents on sexuality and focused on both pre- and extra- marital sexual experiences. Difficulties were faced in obtaining responses to the questions on such 'sensitive' topics. However in an interpersonal situation, by involving the respondents in discussions on health issues, the 'atmosphere' was created for discussion on sexuality. The findings suggested that married subjects were more eager to discuss about the personal sexual experiences, while the unmarried preferred to discuss the subject projecting the experiences of friends and relatives.

4.3.5.1 Sex Orientation, First Sexual experience and Multiple Sex Partners

More than 90 *per cent* truck drivers were married, hence sexually active. In addition to this number the rest unmarried respondents have one more experiences of pre-marital sex. Thus all the respondents were apparently sexually oriented. The age range of respondents at first sexual experience was little over than expectation. Most of them had first exposure to sex by their late teens while a few had by the middle of the twenty. Respondents those were early in sexual experience had first sex with close relatives or fiancées at village, but the tardy cases had first sex

experience with the CSWs and they lost their chastity and sexual virtuous after entering into the trucking line. But of the participants, none was found to have first exposure to sex at bridal bed. Respondents were then asked that whether they had multiple sex partners during the last three months and also explore the total number of sex partners they had during the period they were with the trucker profession. Nearly 70 *per cent* of the respondents freely opined that they had sex with multiple partners during last three months (Table 4.2). But as mentioned earlier that most of the truckers had fixed sex-partners in certain brothels, consequently in most cases the number of partners was corresponding to the number of institutional sex-spaces *e.g.* brothels. However, on average they had 3 and most had 2-4 partners during these months. While a few had 10 more partners. On average they had 5 (4.92, figure abstracted from the figure of total sexual links multiplied by the number of total samples, N) sexual links during the last three months from the time of interviewing. As to total number of partners after whence they were in trucking line, so far they recalled, the number was though incremental but not as high as thought to be. The underling reason was the fixed-up channel of sex network. However, the range of number of partners various from <10 to >100 in accordance to the range of experiences in trucking. The more experiences in trucking profession, the more number of sex-partners.

4.3.5.2 **Pre- and Extra-marital Sex**

Evidently, it has already been assessed that all the respondents had either pre-marital or extra-marital sex. Both unmarried and married had sex experiences. Subjects who were unmarried had sexual relationships as well as married subjects had sex before marriage and after marriage as well. And both the cases either brothel based and floating commercial sex workers were the overwhelming

predominant partners. Moreover, high frequencies were found in both of pre-marital and extra-marital cases such as nearly 55 *per cent* of the married cases and about 80 *per cent* of the unmarried respondents had history of frequent visits to CSWs.

4.3.5.3 **Style of Sex and Pattern of Partners**

The respondents were also asked about the styles of sex that they were usually or occasionally performed as well as the partners they hugged for this. As for styles, several arts of non-vaginal and non-penetrative cuckoldries were recorded *viz.* anal sex (with women), homosexual sex (with men), and oral sex *etc.* However, vaginal intercourse was most frequent style and others were found in few cases and mostly among married aged truckers. The trucker community displayed their overwhelming affection to the CSWs of the both of hotel-based or brothel-based as sex partners followed by boarding/street girls or boys, friends or peers and eunuchs, fiancées as their partners in occasional adultery.

4.3.6 **High Risk Behaviors in Short**

In the end, a summary table can be drawn to illustrate the risk behaviors of the trucker community. It is evident in the Table 4.2 that except the case of using intravenous drugs and sharing needle, most of them had multiple sex partners, both pre- and extra-marital sex and other forms of heterosexuality. Even none of them used to practice safer sex with condom. All these are established as direct factors of being contaminated with simple STD like skin disease to AIDS_ the final and deadly STD. While the peripheral factors like using common saloon/razor was also preponderant among them. Their knowledge, attitude and beliefs regarding safety health and care of life were found almost far from truth. Thus the truckers may have been labeled as one of the 'Core or High Risk Group' and consequently vulnerable to

STDs as well as HIV/AIDS as a result of incorrect knowledge, misconceptions and wrong attitude, beliefs and having unsafe and uncontrolled sex and other practices.

Table 4.2 **High risk Behaviors**

Risk Factors / Behaviors	*f*	%
Sexual orientation (either in the form of marital or pre- or extra-marital)	240	100
First sexual experience at the age range of < 20 years	202	84.17
First sexual experience at the age range of 20-25 years	37	15.42
First sexual experience at the age range of 25 + years	01	0.41
• Age range of first sexual experience is between 15-25 years		
Multiple sex partners (last three months from the time of interviewing)	167	69.58
• Average number of sexual links during the last three months = 5 (4.92) • Range of number of partners during the last three months = 2 - >10 • Range of number of partners in the whole trucking life = <10 - >100		
Pre-marital sex (frequently)	189	78.75
Extra-marital sex (frequently)	141	54.75
Not using condom (in each contact)	240	100
Not using condom (occasionally)	28	11.67
Homosexual sex (men having sex with men)	13	5.42
Oral sex	04	1.67
Anal sex with women	16	6.67
IVD Uses/Sharing Needle	00	0.0
Regular use common saloon/razor	240	100

***Source**: Questionnaire Survey, 1997* *N=240*

4.4 Mobility Behaviors: Trucking Pattern

It has already been established in the foregoing chapter that there is a direct relationship between mobility and STDs and AIDS (*vid.* Chapter 3). Truckers are one of the highly mobile population sub-groups in the country. Moving around the country is their business. This chapter, however, explores as well as explains the mobility pattern of truckers in details. Necessary data and information were aggregated both at micro and macro level. Macro level data were collected from different concerned organisation *viz.* truckers union, owner association, and concern government authority (*e.g.* BRTA). These data were in fact related to trucking pattern in general. While for micro level information, sample respondents were asked to show their respective journeys in terms of frequency, duration, distance and direction *etc.* during last three months from the time of interviewing. These statistics are taken as the background characteristics of the respondents, *i.e.* the independent variables and these are, in true sense, of geography seasoning. Note that epidemiologist or medical sociologist commonly uses socio-economic characteristics or KABP statistics for independent variables. While the present research looks for new dimension by adapting geography seasoning parameter *i.e.* spatial mobility behaviours as the background variables of the respondents. Thus an effective co-relationship can be verified between respondents' mobility behaviors and sexuality as well as STD incidences.

4.4.1 Spatial Characteristics of General Trucking Pattern

4.4.1.1 Trucking Routes and Time Zonings

Trucking routes are officially determined by the concern government authority namely BRTA. There is a precise official specification in determining trucking routes that called as route permit. In the government policy specifications it is stated that certain specific model of heavy vehicles (probable after '73 models) will be given inter-

district route permit, which popularly known as 'District *Gari*'. Thus the new model truck vehicles are allowed to have district permit. On the other hand, trucks with old model engine registered as 'Local *Gari*'. According to an office-bearer of the Owner Association, hardly one-fourth of the total trucks may found to have with this permit. Since most of the trucks imported in Bangladesh are that of reconditioned and of old models. However, unofficially a good number of trucks, whatever their registration status is, are playing in the inter-district routes. Thus there are two types of trucking route in general_ local, and inter-district.

While in practice, it is very difficult to characterise local and district trips in many instances. A good number of trips are either local or regional in nature. Local trips are confined within a city to the nearest city *e.g.* Tejgaon to Mirpur or Dhaka to Narayanganj. The regional trips are characterised by the limits of district perimeter to the closer district e. g. Dhaka to Savar or Dhaka Manikganj. In practices truckers labelled both these types as local trips and the trips that crossed the old or greater districts called as inter-district. There are also other bases of trip classification, such as trip fair and trip distance. However, the most important definition of trip types was given in terms of time to be consumed. Trips consumed less than a one day were called local and the rest are labelled as inter-districts. This connotation is convenient to use and hence taken for consideration. However, on the basis of the above discussion it may be concluded that at least 30 *per cent* of the total truck trips in the country are of inter-district typed and the overwhelming rest are local or regional trips.

Time zoning for truck movement is relatively a new application in Bangladesh and not widely followed. This zoning rule is mainly applicable within the big metropolitan cities especially in Dhaka City and made to avoid traffic jam and accident. Thus the local trips are badly affected by the control and somewhat inter-district trucks too, as they are restricted to enter into the city after deep of the night.

4.4.1.2 Nature of Trucking 'O- D Matrix'

To know the nature of trucking O-D matrix, some of the spatial characteristics in this concern are needed to define first. One of such is the field, in which trucking is concerned, are defined as 'Trucking Space'. These include truck routes, terminals, stands, stoppages and parking lots, truck edges, transits and truck bases *etc.* The trajectory, on which trucks are moving, is defined as 'Trucking Route'. The intermediary locations on particular routes in which truckers have to halt for physical cause such as presence of river on the route are termed as 'Trucking Transits'. The ending or termination points on particular truck route are named as 'Trucking Edges'. Similarly, the places, at where trucks are registered are defined as 'Truck-base'. There are at least six major 'Truck-bases' in the country and of these both Dhaka and Chittagong places on the top of the rank followed by Khulna, Rajshahi, Bogra and Rangpur (Table 4.3). In fact truck owners are living in these locations and thence trucks are registered there, which as a result makes the ultimate destination *i.e.* the origin (O) of the concerned truck. It should be mentioned here that some owners might purchase second-hand truck form other districts where it was previously registered. However, after being the owner of those trucks one than changes the registration number in favour of his name and location of his own residence.

Table 4.3 **Distribution of Trucks by the Truck-bases**

Regions (City areas)	% of the Country's total Trucks
Dhaka City	38%
Chittagong City	37%
Khulna City	13%
Rajshahi City	7%
Bogra City	3%
Rangpur City	2%

Source: *Organisational Survey, 1997*

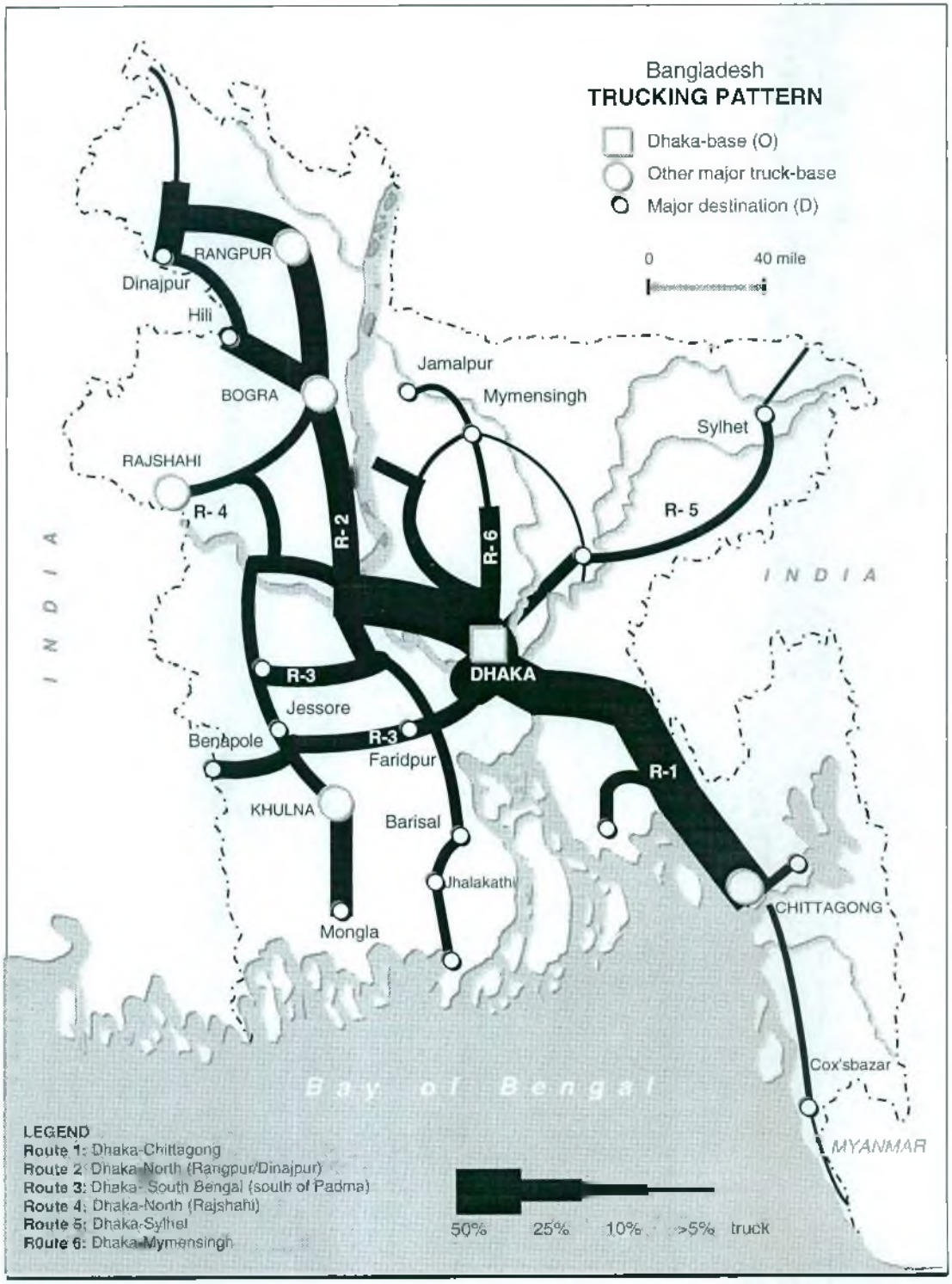
A truck starts its journey from a certain base-point that termed as origin ('O'). As the same time all trips have an end, termed as destination ('D'). Thus the flow pattern can be arranged and be shown in matrix form, termed as trucking 'O-D Matrix'. Since the present study was concerned only the Dhaka-based one-way truck trips, then the origin (O) of all truckers was same. But the destination were numerous and stretched out over the country.

In the Table 4.4 as well as in the Figure 4.1, the flow line map demonstrates the magnitude and directions of average daily truckers' flow from Dhaka. It is evident in the figure that most of the trucks move on five major routes *viz.* Dhaka-Chittagong, Dhaka-North Bengal, Dhaka-South and Southwest, Dhaka-Rajshahi and Pubna, Dhaka-Sylhet, Dhaka-Mymensingh *etc.* These are major Dhaka-based truck routes. Nevertheless, these routes are also nationally important too. Such as Dhaka-Chittagong route that along covers 47 *per cent* of the total trips from Dhaka. However, of these routes some of the destinations are more important, which include Khulna, Mongla, Jessore, Benapole, Chittagong, Rajshahi, Bogra, Rangpur, Dinajpur, Hili, Banglabanda *etc.* These are either seaport or landport and either divisional or district headquarters of the country. These lines are busier because of carrying import and export goods or of general business and commercial purposes.

Table 4.4 **Percentage Flow of Truck Trips from Dhaka towards Different Major Routes**

Routes	**Flow of Truck (%)**
Dhaka-Chittagong	47
Dhaka-North Bengal: (Bogra-Rangpur-Dinajpur)	21
Dhaka-South and Southwest	17
Dhaka-North Bengal: (Rajshahi-Pubna)	3
Dhaka-Sylhet	3
Dhaka-Mymensingh	2

Source: *Organisational Survey, 1997*



Source: *Field Survey, 1997*

Figure 4.1 *Percentage flow of truck trips from Dhaka-base, the origin node (O) towards different major directions. The figure also shows the truck-bases and important destination (D) in the country as identified in the field survey.*

4.4.1.3 Nature and Spatial Distribution of Transit Points

It was also found that there were several transit points in each route except Dhaka-Chittagong line. These points are characterised by the stopovers or short stay for physical cause such as presence of river on the route. In other words these are ferry *ghats*. All the vulnerable transit points in the country were assessed and recorded (Table 4.6). The vulnerability was defined in relation to waiting time and number of trucks waiting for serial. It may not be unreasonable to suspect that the ecological characteristics of a transit point such as traffic jam, long serial, lack or absence of means of time passing and resting may create irritation on truckers' mind. This consequently may lead them to irregularities like taking alcohol or having sex for recreation and passing time. It was seen during participatory observation that truckers were well understood with the local ecological nature of different transit points and they have a mental map about what to do under regular conditions. Moreover, in some cases, whilst the truckers let know that no chance to get ferry within next twenty-four hours, he often turned away the truck in the parking-lot for resting-places. Keeping this in mind, all the transit points in the country recorded from the truckers' point of view (Table 4.6).

Table 4.5 **Three Days' Statistics on the Number of Vehicles Crossing at Aricha Ferry *Ghat***

Data	18 August, 1995		24 September,1995		13 october,1995	
Route	Crossed	Waiting	Crossed	Waiting	Crossed	Waiting
Aricha-Nagarbari	370	400	561	455	435	310
Aricha –Daulatdia	257	40	336	86	433	105
Nagarbari-Aricha	332	741	576	250	471	295
Daulatdia-Aricha	230	92	333	152	303	

***Source:** CEDAR, 1995*

Aricha is recorded as the ever largest in the country by which two of the major route *e.g.* Dhaka-North and Dhaka-South are connected. On average 700 truck cross Jamuna River every day through this *ghat*, of them 500 run towards North Bangle through Aricha-Nagarbari *ghat* and the rest towards South through Aricha-Daulatdia *ghat*. Even miles after miles truck jam are common phenomenon on Aricha road and truckers have to await days after days ranging from a one day to seven days for crossing over (Table 4.5). Recently, the importance of the *ghat*, especially of the Aricha-Nagarbari *ghat*, has dramatically been reducing to be unconcerned after inauguration of Jamuna Bridge. Other than Aricha, three more transits were identified vulnerable in respect to the length of time killing and number average truck waiting for at *ghat*. These are Bhairab, Sadipur, Pakshi and in each a one-day for having serial is normal. However, there are also many *ghat* on different routes, but not recorded due to its less importance. For examples, to go to the extreme end of the Dhaka-South route *e.g.* Dhaka-Patuakhali, one has to pass over at least eight ferry crossings. This number is the highest in the country, but not important in terms of wasting time.

Table 4.6 **Distribution and Characterising Features of the Major Trucking Transits**

Transit points	Waiting Time (days/hour)			Route	Daily Truck Crossed	No. of Trucks waiting for
	Minimum	Normal	Maximum			
Aricha-Nagarbari	3 days	4/5 days	7 days	Dhaka to N. Bengal	300/400	700
Aricha-Daulatdia	1 days	1/2days	3 days	Dhaka to S. Bengal	150/200	550
Pakshi	< ½ day	1 days	3 days	North to S. Bengal	200	100
Bhuapur	< ½ day	>1days	3 days	Dhaka to North	100/150	100/150
Mawya	5/6 hours	1 days	2 days	Dhaka to S. Bengal	150	50/100
Bhairab	1 hour	3/5 hours	< 1 day	Dhaka-Selhet	100/150	N.A.

***Source**: Organisational and Qualitative Survey, 1997*

These transit locations become worsen in the winter, the peak season in the trucking line. In the winter, river level of the country severely goes down; and numerous point bars are being growing up in the mid-channel of the river, which cause frequent disturbances in ferry movement in different routes of the country. This situation is further geared by the huge flow of trucks in the peak season of winter. Thus critical traffic jam is found to be common in the winter of each year at the big ferry crossings in the country.

4.4.1.4 **Trucking Edges and Ports**

The another important feature in the truck routes is the edge points characterised by land ports, seaports, or important border crossings. As mentioned earlier that the ending or termination points on particular truck route were named as trucking edges. Except the two seaports in the country all truckers' edges are either land port or important border crossing. There are about more than 100 border crossing and land port in the country, of which nearly 85 *per cent* are ineffective. While the rest actives are continuously operative and equally important (Discussion with an Assistant Commissioner of Customs, Custom House, Dhaka, 1988)[11]. However, a total of 13 trucker edges was identified, of which eight were land ports (Table 4.7). Benapole is the ever-largest land port in the country followed by Hili, Tamabil, Burimari, Sonamasjid, Banglabanda *etc.* Teknaf is the only edge placing on the Bangladesh-Myanmar boarder, and the rest all sparsely circumvent Indo-Bangladesh international boundary line.

It has already been mentioned that the neighbouring countries of Bangladesh are at high risk for STD/AIDS. Especially Indian situation is the fast becoming worst. However, some recent statistics can be put here as evidence. Presently, the number of HIV positive cases in India is around 8-10 millions and most of them likely to be AIDS

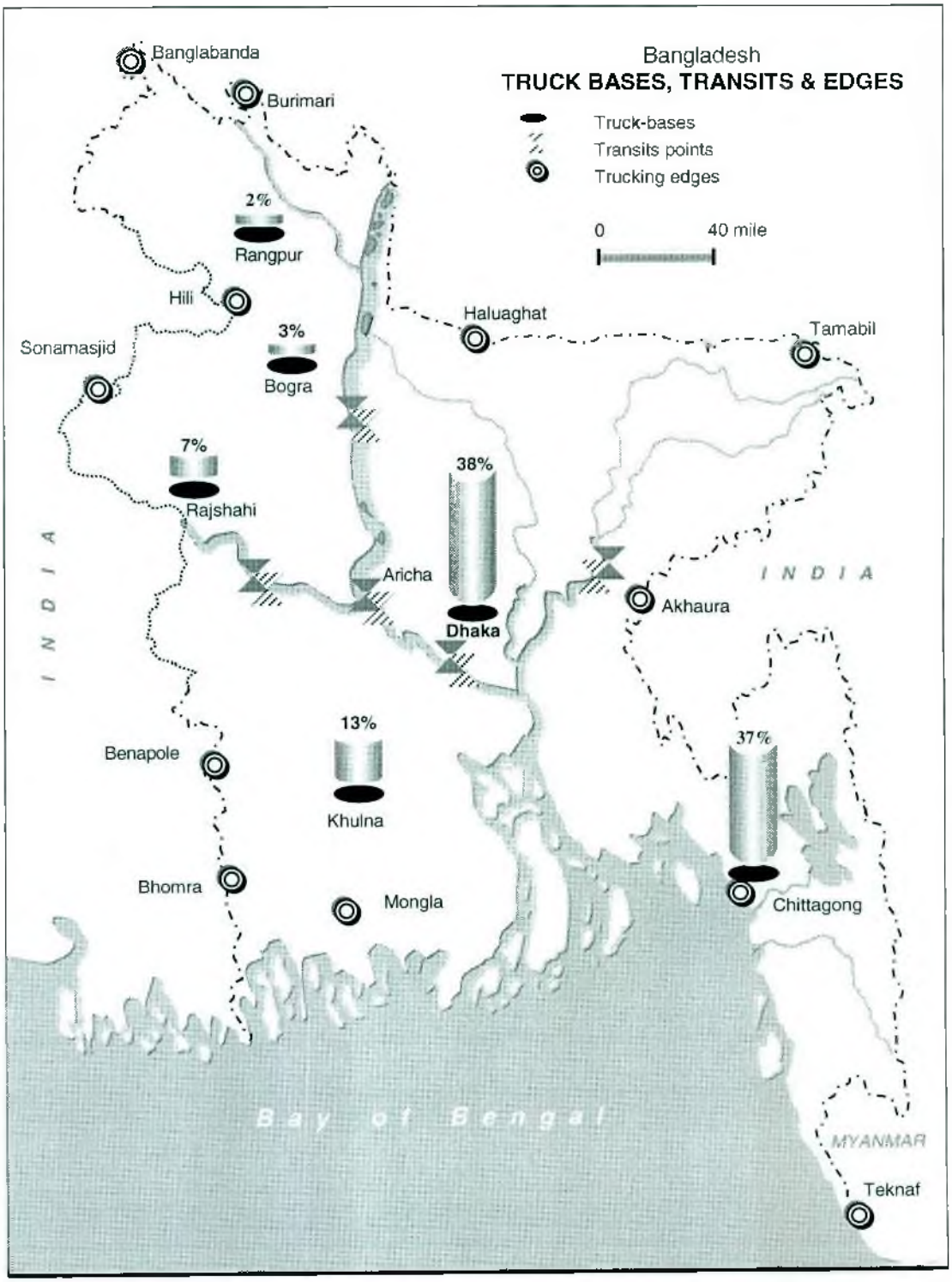
infected within near future and it also very likely that Mayanmar and India are going to the core of the AIDS tract in the world (Choudhury, 1998). Considering the threatening AIDS situation in the neighbouring countries along with the locational, environmental and other contextual characteristics of theses transit areas (details of locational characteristics is discussed in Chapter 5), it may not be witless to make comment about the vulnerability of these transits. Even under the 'business as usual' condition these areas may play the role of 'AIDS gate' for Bangladesh.

Table 4.7 **Spatial Distribution of Trucking Edges**

Name	Route	Status	Remark
Chittagong	Dhaka-Chittagong	Sea port	Largest sea-port
Mongla	Dhaka-South	Sea port	Second largest sea-port
Benapole	Dhaka-Southwest	land port	Largest land port
Hili	Dhaka-North	Land port	2nd. largest land port
Tamabil	Dhaka-Sylhet	Land port	3rd. largest land port
Burimari*	Dhaka-North	Land port	4th. largest land port
Sonamosjid	Dhaka-North	Land port	5th. largest land port
Banglabanda*	Dhaka-North	Land port	6th. largest land port
Kamalpur	Dhaka-Mymensingh	Border crossing	Ordinary
Haluaghat	Dhaka-Mymensingh	Border crossing	Ordinary
Bhomra	Dhaka-South	Border crossing	Ordinary
Akhaura	Dhaka-Chittagong	Border crossing	Ordinary
Teknaf	Dhaka-Chitlagong	Border crossing	lies on Myanmar border

Source: *Organisational and Qualitative Survey, 1997*

* *Transit used by Nepal and Bhutan*



Source: *Field Survey, 1997*

Figure 4.2 *Several spatial properties of truckers' movements. This includes truck-bases, transits points on different routes and the extreme edges of trucking routes. The figure also indicates the percentage delivery of truck from different truck-bases in the country.*

4.4.2 Seasonal Variation in Trucking Pattern

There are two seasons in the trucking industry *viz.* '*Kamer Moushum*'(peak season) and '*Mora Moushum*' (dull season). It seems to be a continuum in which one begins at the end of another. Peak season starts in the Bengali month of *Kartik* (mid of October) and lasted unto the month of *Jaysthya* (mid of May). While dull starts *Jaysthya* and continues up to *Kartik*. This seasonality is very much climacteric in the cases of local trip. Nevertheless, this is also true for the case of inter-districts transportation. In the peak season, at least 10 trips were made between Dhaka and Chittagong in a month, while it comes down to 5/6 trips in the off season. On average 2000 trips/day or 50,000 trips/month from Dhaka were made in the peak season. But it declines around 25 *per cent* in the dull season.

The peak season is characterised by winter and spring, while the dull by summer and rainy. In the rain, several economic actives in particular areas of the country such as construction and civil works, brick-fields in flood-plains, timbering in Chittagong Hill Tracts and other hilly areas in the country, stone mining (stone, boulder and collection of sand stone in Jaflong, Bajarpur) *etc.* come down near to stop, then trucking too.

Table 4.8 **Trucking Seasons and Seasonal variation**

Seasons	**No. of Trucks drive out from Dhaka City**
Kartik-Jaysthya	2000 trips per day
Jaysthya-Kartik	1500 trips per day
In case of a single truck	
Kartik-Jaysthya	10-12 trips per month
Jaysthya-Kartik	5-6 trips per month

Source: *Organisational and qualitative Survey, 1997*

4.4.3 Trucking Pattern of the Respondents

The respondents were asked about there mobility behaviours. The questions were predominantly focussed on the last three months behaviours. Following are questions-wise description of the respondents' mobility behaviours.

4.4.3.1 Numbers of Days Away from the Family

The most striking feature in the trucking profession is that of long absence from family touch. Truckers have to away from their family for a few days to over a half-year of time period. It was evident that most of them visited their families after each quarter of a year and only for a few days to hardly a week. Even sometimes they are forced to continue working months after months especially in the peak seasons (Table 4.10c). This situation may cause a long period of absence form family that usually not less than a half year. While those living with their family in the origin (O) or those home district not so far from the job place are seen to have scope of redundant visitations to family. It is the truckers' responsible to replace a part-time employee during the time of their absence from the job. One respondent discloses that they feel apathy for detaching from their family and this one of the most important reasons of visiting sex-workers. They visit sex workers not only for having sex but also to have closer touch, which they fail to have from own family due to their job nature.

Table 4.9 **Frequency Distribution of the Number of Days Away from the Family**

Numbers of days (in month)	*f* (N= 240)	% of the Total Respondents
< 1 months	49	20.41
1-3 months	109	45.41
4-5 months	74	30.84
>6 months	8	3.34

Sources: Questionnaire Survey, 1997 * *Multiple answers have considered*

4.4.3.2 Numbers of Trips and Number of Days on Road

The number of days on road depends on the nature and length of specific trip. The respondents were all inter-district drivers. Hence they are suppose to drive long distant routes. Nevertheless, it was apparent that they were used to make local trips on off chance. But the number of local trips made by the respondents was not substantial as thought to be. On average they made hardly 25 *per cent* of the total trips during last three months and for each local trip they had to spend only few hour to less than a day. While most of the trips are inter-districts oriented. Majority of the respondents was recorded performing around 30 single-way long distance trips (either up or down trip) during the last three months from the time of interviewing (Table 4.10a). Most of the long distant trips captured huge time and they had to rest on the road for several days. Table 4.10(b) shows that about 55 *per cent* had been on the road for 1-4 days, even though few in number some had to spend over 10 days on the road. These figures were applicable to the single trip only. Then the respondents were further asked about the total day they spend on the road during the last three months. The Table 4.10(c) shows the most of them have to on move for about 50 to nearly 80 days, even some have to more days during last three months. This picture clearly makes the fact that how much travelling irritation with the long distant truck drivers.

4.4.3.3 Usual Driving Hours

It is not only the fact that the truckers have to stay on the road for long days, even they have perform long hours non-stop driving. An uncertain job hour is also another striking feature in the trucking profession. This is particularly true for those engaged in inter-district driving. The data reveals that 3-6 hours non-stop driving is common in inter-district trips. While some respondents found to be performed more than 6 hours non-stop driving. In some urgent cases, if it is needed, sometimes they

have to continue even 10 hours. One of wintry respondents opined that long non-stop driving hours is one of the causes of frequent road accidents by the truck drivers.

Table 4.10 (a) **Number of Inter-district Trips during Last Three Months**

Trips (one-way only)	*f* (N = 240)	% of the Total Respondents
< 20	39	16.25
20 - 30	128	53.34
> 30	73	30.41

Table 4.10 (b) **Number of Days on Road for Each Inter-district Trip**

Numbers of days	*f* (N = 240)	% of the Total Respondents
< 1 day	53	22.08
1 - 4	133	55.42
5 – 9	46	19.17
10 +	08	3.33

Table 4.10 (c) **Number of days on Road during Last Three Months**

Numbers of days	*f* (N = 240)	% of the Total Respondents
< 30 day	32	13.34
30 – 49	65	27.08
50 – 79	135	56.25
> 80	08	3.33

Source: *Questionnaire Survey, 1997*

Table 4.11 **Average Non-stop Driving Hours in a Trip**

Driving Hours	*f* (N = 240)	% of the Total Respondents
< 3	27	11.25
3 - 6	166	69.17
> 6	47	19.58

Source: *Questionnaire Survey, 1997*

4.4.3.4 Distant and Time Taking Routes

The distance of a route can be measured by actual physical distance or mileage or by the travelling time to be needed. In this sense the distant route should corresponds the time consuming route. But in the trucking reality this fact is not always true. For example, the routes of Dhaka-Rajshahi and Dhaka-Chittagong are not so different in terms of actual mileage distance, but so different in terms of trucking hours. A trip from Dhaka to Chittagong or vice-versa may hardly needs a day, but needs at least 5/6 days for the case of Dhaka-Rajshahi route. This due to the interim obstructions *viz.* delaying at ferry *ghat*, traffic jam, police harassment *etc.* faced by the truckers. Thus the question as to time consuming routes were asked to the respondents. The answers were arranged in the form of the range of minimum to maximum times needed as experienced by the respondents during the last three months at the time of interviewing (Table 4.12). In the Table, Dhaka-North routes (Dhaka-Rajshahi and Dhaka-Rangpur) were shown on the top rank. The underling reason of this delaying is that of Aricha-Nagarbari ferry crossing, which along usually takes several days. These intervening times make the truckers irritate and inspire them to have sex with CSWs or other irregularities, which in turn push them at risk of STD.

Table 4.12 **Perceived Range of Times Needed For Different Routes**

Routes	Time needed*	Rank
Dhaka-Chittagong	1 to 1+ day	5
Dhaka-South	1 to 4 days	3
Dhaka-North Bengal (Bogra-Rangpur-Dinajpur)	5 to 6 days	2
Dhaka-North Bengal (Rajshahi-Pubna	5 to 8 days	1
Dhaka-Sylhet	1 to 2 days	4
Dhaka-Mymensingh	< 1 to 1 + day	6

***Source:** Questionnaire Survey, 1997*

***Note:** Experienced by the all respondents and the experiences are tabulated in the form of time range. Thus in the case of Dhaka-Chittagong, for example, time range is '1 to 1+ days', meaning that respondents experiences lies between this range.*

4.4.3.5 Saddening routes

There are other sides in measuring distant routes which indeed experiential or psychological or in words some intervening practical problems on different routes may create negative images about respective routes. This idea is translated here as depressing or saddening routes. This is also important to know for understanding the respondents' psychological parameters of sexuality from spatial point of view. Therefore, the respondents were asked to identify the routes they feel boring in view of their whole trucking life. The longest routes, or time consuming routes and routes with more ferry or jams or police or musclemen or having no or less facilities for resting and less fare or less chance of having return trip are the common characteristics of the depressing routes. In the Table 4.13 different harassment are grouped into four categories X_1, X_2, X_3, X_n *etc.* These indicate police harassment, robbery /theft, traffic jam, and others harassment respectively. It is also evident that robbery, and traffic jam and especially police harassment are the commonest annoyances on the highways of the country. To the respondents, the magnitude of these problems may somewhat be changed on different routes for some whiles but the phenomenon of police harassment remains constant all over the country.

However, different respondents are experiencing on different routes in different way. Nevertheless, there were some common feelings about respective routes. For example, most of the respondents identified the Dhaka-Chittagong route for the problems of *mal kata* (theft) This incident interestingly has a filmy style and dramatic essence. While Dhaka-Mymensingh route characterises with robbery; Dhaka-Sylhet with police harassment; Dhaka-South with musclemen and tool-collector and Dhaka-North with ferry and jam. Besides, this harassment has other properties *i.e.* the time dimension. Theft and robbery, for example, usually happen at night times, while policing and others may take place any time though mostly seen at daylights.

For organising the depressed routes in accordance to the rank order index values were calculated. The method of indexing has been explained in the footnote. However, it is apparent in the Table 4.13 that the most troublesome route was Dhaka-Chittagong followed by Dhaka-South, Dhaka-Mymensingh, Dhaka-North and others (Table 4.13).

Table 4.13 **Ranking of Saddening Routes as Perceived by the Respondents**

Criteria (x_i) / Routes	Harassment (f)				Index	Rank
	X_1	X_2	X_3	X_n		
Dhaka-Chittagong	210	**240**	140	120	0.74	1
Dhaka-South	180	170	130	**220**	0.73	2
Dhaka-North (Bogra-Rangpur-Dinajpur)	120	120	**240**	20	0.52	4
Dhaka-North Bengal: Rajshahi-Pubna	80	120	**240**	25	0.48	5
Dhaka-Sylhet	**210**	40	20	20	0.30	6
Dhaka-Mymensingh	140	**240**	130	110	0.64	3
Column Total ($\sum x_i$) =	940	930	900	515		
Grand Total or $\sum_{i=1}^{n} x_i = \{\sum (X_{1+} X_{2+} X_{3+} X_n)\}$ =	3285					

Source: Questionnaire Survey, 1997

Note:

Bold value *= characterising feature in the respective routes*

X_1 = *police harassment*

X_2 = *robbery /theft*

X_3 = *traffic jam*

X_n = *including musclemen/tool collector/having no or less facilities for resting and less fare or less chance of having return trip*

$$\textbf{Index value} = \frac{\sum x_i}{N \times 4}$$

Note that the sum of N has been multiplied by 4, because multiple opinions from each respondent were considered and since the total respondents or N was 240 and the response categories were 4, therefore, N has been multiplied by 4.

4.4.3.6 Stopovers/Short Stays on Routes

As noted earlier that there are some stopovers on the several routes for physical cause. Besides these, there are also different types of short-stay where truckers have to stay for resting on the long way of trip. For example, on a trip from Dhaka to Bhuapur; after four hours journey driver may be exhausted or may find risk for journey at night; in this case he may halt in some known places in Tangail. often these places are brothel or anywhere linked with sexual networks. The respondents were questions about these stopovers. These were indeed plenty in numbers and subject to personal interest, hence not recorded. But usual characteristics were noted (Table 4.14). Usually these places are residential hotels or boarding houses, brothels, shops, garages, union or transport agency office, or some resting places with or without having dwelling facilities. Even some cases slum areas on the highway may have been used as resting-place. It was generally noticed that senior drivers have an inclination in showing disregard to brothels and slum areas as resting-place, even they hardly acknowledged visiting brothels for this purpose. Rather there were found conceit to have sex with hotel based sex workers and to them, it causes money lost, but safe. While, the juniors and helpers had freely disclosed their interest to anything available within their range. Interestingly, senior and junior, especially driver and helper, as they are *Ostad* and *Sarged* in relation to each other, never do sex together, though it is open secret among them.

These stopovers or resting-places are the most vulnerable compare to other trucker-places. As observed that most of sex acts and other risk practices among the truckers have been taking place in theses locations, if they have money in hand. One of the elderly member of the trucker community freely disclosed that drivers have ample of unseen earnings by unscheduled trips or by black-selling of fuel and money are commonly spent on sex and other risk practices.

Table 4.14 **Distribution of Stopovers/Resting Places by Nature**

Nature of Stopovers/resting places	*f (N = 240)*	% of the Total Respondents
Residential hotel/ boarding house	123	51.25
Brothel	63	26.25
Union or transport agency office	16	6.67
Sum area	11	4.58
Others*	27	11.25

Source: *Questionnaire Survey, 1997*

Note Others = *shop, garage, in the truck, on road etc.*

4.5 Cross-sectional Properties

This chapter, as mentioned in the introduction section, consists of three sections covering the background characteristics of the respondents. it is also shown in the conceptual frame of the present study that these variables are interrelated. Then it important to see how and how extent these variables are inter-related. This section, therefore, considers this point. The present research is primarily inductive-descriptive or ideographic exploratory in nature (*vid.* conceptual frame or philosophical perspective of the research in Chapter 1). Even no rigid inferential basis had been taken to be studied, such as empirical testing *a priori* hypotheses, then simple cross-sectional analyses were made from qualitative statements of the respondents so that development of an inferential basis *i.e.* development of hypotheses can be possible for further studies.

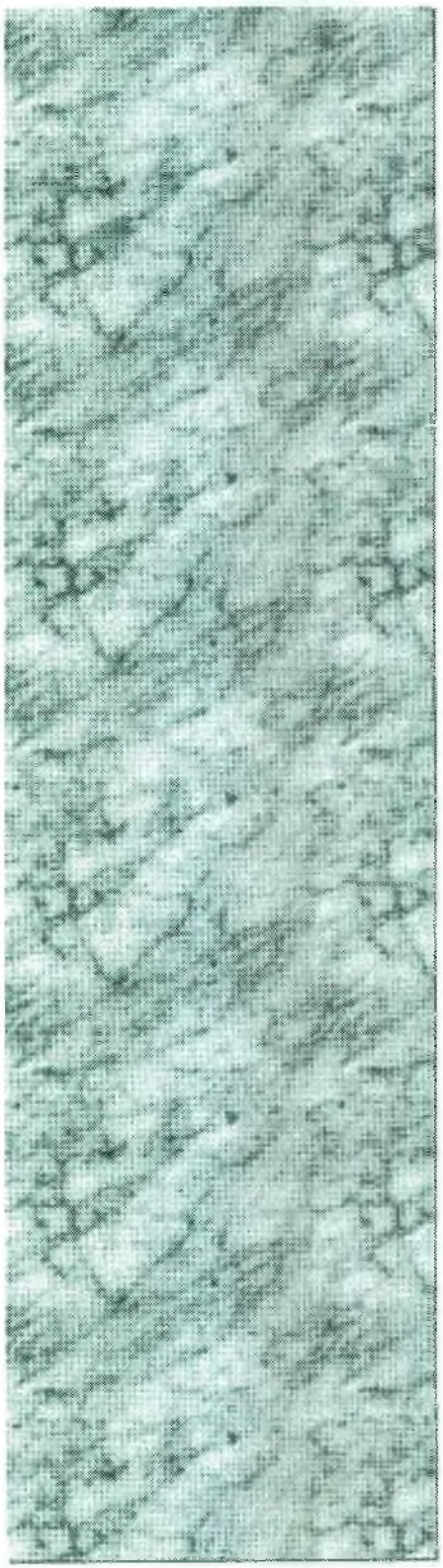
It is not unanticipated to have some coherence between socio-economic characteristics and the high-risk behaviors of the respondents. But it should keep in mind that the present study concerns only with a homogeneous community. Even the only significant variance among truckers *i.e.* driver vs. helper was also ignored and

only the long-distance drivers were considered for studying. Eventually the studied population becomes unvaried and hence no momentous differences in risk behaviors were seen. However, a little bit deviations of risk behaviors were also inscribed in relation to age, experience in tucking, income level, marital status, presence of family at present address, burden of family *etc.* It was conspicuous that unmarried, less aged and unseasoned but earned better income class respondents were more involved in risk course of actions. While those had been living with family and bearing burden of big family were less prone to risk factors. The community members showed sundry sort of socio-economic characteristics as regards to risk manner in which no meaningful pattern exists.

Similarly, no significant pattern was found in mobility *i.e.* trucking behaviors of the respondents in relation to their socio-economic characteristics. But there is distinct relationship was seen between mobility, sexual networks and the incidence of STDs, which is also the core assumption of the present study. Therefore details analysis was made in forthcoming chapter, the core of the present thesis.

Chapter 5

SPATIAL ASPECT OF THE VULNERABILITY



5.1 Introduction

In the mean time, STD like AIDS has already been emerged as the most vulnerable crux for the whole mankind, though the epidemic has not yet been breaking out on a deadly scale in many parts of the world like Bangladesh. Nevertheless, threatening of AIDS remains unchanged in these parts. Therefore, the phrase 'vulnerable to AIDS' has become a public issue. The term commonly refers to several high-risk behaviors (*vid.* Chapter 2 and 3). One of such crucial is the heterosexuality prevailing in particular community, by which AIDS, and other STDs, even many ordinary infectious, and communicable diseases may be diffused within the whole society, especially in a conservative society like Bangladesh (National Policy on HIV/AIDS and STD related Issues, 1996). This chapter, the core of the whole thesis, however covers the issue of vulnerability to STD/AIDS among the trucker community in Bangladesh in the light of their sexuality_ the basic cause of STD/AIDS.

As mention earlier that though the present thesis concerns with the epidemiological concept of vulnerability to STD/AIDS, but from geographical approaches and tastes. It is also mentioned that vulnerability to STD/AIDS was approached from its most important factor of sexuality. Thus the chapter starts with the conversion of the sexuality into spatial frame such as sex-space, its spatial identity and nature, temporality and dynamism, geographical distribution with spatial pattern and formal regionalization of sex-spaces *etc.* as an initial attempt to have a geographical orientation of human sexuality as a whole but trucker sexuality in particular.

The chapter then penetrates into the spatiality of vulnerability to STD/AIDS in the light of the epidemiological concept of risk networking and once again transformation happens and new term 'Spatiometric Risk Network' appears. In this

section vulnerable locations are searched and categorized with the help of graph theoretic algebraic techniques and their functional regions (risk or vulnerable regions) are delineated.

The chapter then turns into critical analysis for prediction in which simulation of the direction of spatial diffusion of STD/AIDS, it temporality, infectability *etc.* are done. An attempt has also made to understand the empirical evidence of this prediction and thus spatially of the incidence of STDs namely STD-cores has been established.

Then the chapter comes to the question as to how and why some locations become vulnerable to STD/AIDS. Thus locational and environmental determinants of vulnerability are explained along with other socio-psychological factors.

Finally, the chapter ends with an endeavor to ordain policy implications and spatial strategy and follow-up system for STD/AIDS intervention.

However, for convenient, the chapter can be organized in several sections namely spatial aspects of sexuality; spatial aspects of risk networking; forecasting and prediction of spatial diffusion of STD/AIDS, spatiality of the incidence of STD; locational and environmental determents of vulnerability; and planning spatial intervention and flow-up system. These are given in detains in the followings.

5.2 **Spatial Aspects of Sexuality**

5.2.1 **Nature of Sex-spaces**

The sexually active respondents were requested to name the places as much as possible where they had sex during the last three months and in their lifetime as a whole. They recognized so far as they look back. The places are arranged in the Table 5.1. The respondents were able to rank sex places only in two orders. All respondents mentioned different established brothels in the country as first order.

While for second order, several places were identified (Table 5.1). In fact most of these places of second order are characterized by the concentration of floating sex workers (FCSWs). However, they mentioned some places *viz.* in their own house, mess, or in their village areas *etc.* where they had sex with their relatives or fiancées. It was also mentioned that most of these places were located in the major metropolitan cities, district headquarters, port/*ghats*, or along the high ways or traffic routes of the country.

Table 5.1 **Distribution of Sex-spaces by Nature***

Sex-spaces	*f* (N=240)	%	Rank
Institutional/Recognized/Formal sex-spaces			
Brothels/Red-light areas	240	100	1
Non-institutional/Informal or Hidden sex-spaces			
Residential hotels	210	87.5	2
Park	89	37.08	3
Slums	67	27.91	4
Village	65	27.08	5
Open space	45	18.75	6
Own house	37	15.41	7
Ferry *ghat*	29	12.08	8
Launch *ghat*	22	9.16	9
Mess	35	14.58	10
Jungle	15	6.25	11
Vacant office	12	6.25	11
Disposed rail wagon	8	3.33	12
Garage	05	2.08	13
On truck	01	0.41	14

Source: *Questionnaire Survey, 1997* * *Multiple answers has been considered*

In the Table 5.1, different sex-spaces are shown. A total of 15 distinct places were identified where the respondents had sex with CSWs except some few cases with relative or fiancées. All the respondents were found to visit at least once to the country's recognized brothels and nearly all had sex frequent experiences at the several residential hotels or boarding houses in different parts of the country. It may be mentioned here that residential hotels are rather well preferred to the respondents. The underlining reason is safety and cleanliness. While there were also other places in which they had occasional sex experiences and mostly with either floating sex workers or street girls. In contrast to the general sentiment, one exceptional case has been found, whom had once an experience of sex on his own truck. Usually truckers look upon their truck with heavenly respects, since it is the means of their earnings and livelihood. Off course, the very respondent seemed to be despondent for that of incident.

It is also seen that there is an apparent relationship between types of sexuality, sex-partners and location of sexual contacts. For example, people who are heterosexuals, are mostly sex buyers and for buying sex, as shown in the Table 5.1, one may visit brothel or may find street or hotel-based floating sex worker. Thus obviously commercial sex workers are the sex-partners of heterosexuals. On the other hand, the location of these different types of sex worker is not alike. Then, especially, commercial sexuality can also be approached from geographical point of view and accordingly new terminologies are needed to define the spatiality of sexuality (Figure 5.1). The figure illustrates the dichotomy of sexuality, first, from traditional point of view that usually available in the socio-medical and epidemiological literatures. Then all are metamorphosed to fit into the spatial frame. This conversion was done so that the phenomena of human sexuality may be fitted for geographical-spatial analysis.

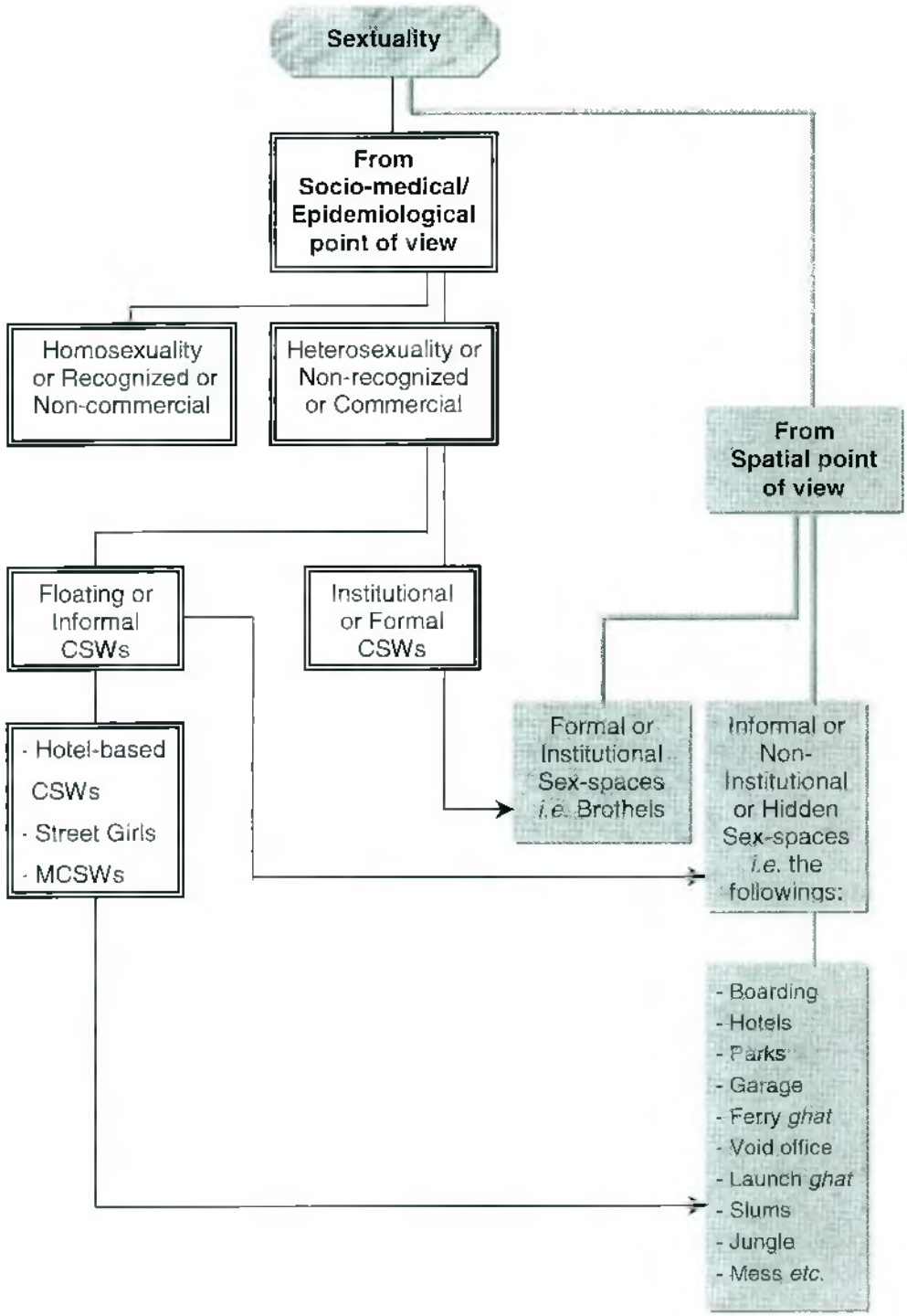


Figure 5.1. *Dichotic terminolization of sextuality. The left part of the flow diagram is designed from epidemiological or socio-medical perspective and the right is developed from geographical point of view and transformed the sexuality related terms into spatial frame. Details of theoritical discussion is also provided in Chapter 3.*

5.2.2 Dynamics of Sex-space

The genesis of the 'Ionosphere' in the outer space and the truckers' sex-space in the earth space of Bangladesh is interestingly something identical in term of temporal dynamic nature. This was instantaneously encountered while the respondents were asked about the timing of their sexual activities in respect to the nature of sex-spaces. The critical upper level atmosphere, the so caller Ionosphere, appears at daylight and disappears after sun set. Coincidentally sex-space of truckers customarily inaugurates after sun set and outlasts up to the death of night, but evaporates at the daylight. This episode may especially true for the places used for having sex with the absolute floating CSWs, *e.g.* street girls. The respondent truckers confessed their own encountering places, which include dark flecks in the city parks, slums, residential hotels, office camps, known garages *etc.* (Table 5.1). These places can be termed as informal or hidden sex-spaces, since the places are characterized by the concentration of unlicensed floating FCSWs or MCSWs. This group of sex worker is neither socially recognized nor their business is permitted by the legal authority. Hence this so-called 'fallen groups' and their work always tends to be located in something mystic, underground or hidden places with peculiar timing. This tendency makes the space and the people and their activity on it, become hard-to-reach, and makes severe problematic for implementing the conventional strategy of 'particular-location-based' and formal 'office-time-based' interventions. Thus alternative strategy and approach needs to think about. One of such approaches is suggested here that includes detailed identification and contextual mapping of these typical spaces, and peer oriented street outreach or scattered and off-time based interventions may be considered.

While the brothel-based sex activities are formal in nature, since authorized, then these space are more static, and easily identifiable. However, sometimes even

long established brothels may have been evicted, and consequently informal hidden sex-spaces may be diffused over the whole urbanscape. Recently, a century old brothel on English road in Dhaka City, called 'Kandupatti', for instant, had been demolished by the local community, which thought to be caused unprecedented perfusion of floating sex workers and hence hidden sex-spaces over the whole city.

5.2.3 **Spatial Distribution of Sex-spaces**

In the foregoing sections it is evident that there were plenty of informal sex-spaces, and which were sundry in nature. The exact locational distribution of each type was not taken into account because of ethical question and partly due to very practical reason. The present research is by no means a police query and hence to identify the hidden sex-spaces had not been considered for ensuring the respondents' confidentiality. However, the magnitude of the problem can be well understood from a newspaper's report in which revealed that police recorded more than 200 residential hotels in Dhaka City area engaged in illegal sex business. The same report also wrote that police arrested 75 sex workers from single residential hotel (The Daily Janakantha, 4 July 1998).[12] Similar picture was found in participants' responses. Some statements were made spontaneously by the respondents as to the major concentrations of these hidden spaces in which it is apparent that these spaces were not ubiquitous in general. Particularly hotel based CSWs and absolute floating CSWs (*e.g.* street girls) were seen at busy places like stations, ports, *ghats* or public places like parks, recreation spots *etc.* in major cities especially where no recognized brothel exists. Thus Dhaka-Chittagong, Dhaka-North and Dhaka-Sylhet routes were exposed to have more floating sex (Table 5.2) and the city of Dhaka, Chittagong, Rajshahi, Sylhet, Barisal, Kustia *etc.* were shown as the most prone to hidden sex-spaces in the country.

It is needed to note here that the incident of unplanned eviction of formal sex-spaces *i.e.* brothel may have been resulted hidden sex-spaces and this is why hidden-spaces are found to be prevailing in that locations where brothels are being forcedly driven out (Figure 5.2). This in turn makes the situation critical. Hidden sex-spaces always go beyond estimation and in fact no systematic prediction and network intervention planning is truly possible under this situation. Thus random eviction of any kind should not be incorporated or even not encouraged in the government policy and planning.

Table 5.2 **Routes Prone to 'Hidden Sex-space' as Perceived by the Respondents**

Trucking Routes	**% of Hidden Sex-space**
Dhaka-Chittagong	29
Dhaka-South	15
Dhaka-North (Rajshahi, Pubna *etc.*)	21
Dhaka-North (Bogra, Rangpur, Dinajpur *etc.*)	19
Dhaka-Sylhet	13
Dhaka- Mymensingh	03

Source: *Questionnaire Survey, 1997*

While the formal or recognized sex-spaces *i.e.* brothels or also informally called as 'Red Light Areas' were duly identified and recorded as details as possible during the interviewing sessions (Table 5.4). Some authors and organizations have shown that there were 10 to 15 large brothels and sizable number of floating sex workers in Bangladesh and estimated that the number of registered CSWs were around 100,000 (Kabir, *et al.*, 1989; Siddique, *et al.*, 1990; VHSS, 1993; Khan, and Arefeen, 1992; Hossain, *et al.*, 1996; UICEF/Care, 1987). This number seems

somewhat overestimated. The present researcher estimated a total of 34 established brothels in the country of which 15 had already been evicted by the local community between last two to ten years (Figure 5.4). Surprisingly, all of these were well known in details by the respondents. Nearly all of them visited these areas at least once in the life. The present researcher had thus been able to approximate the number of sex-workers in the country (Table 5.3). The assessment shows that the number of brothel-based CSWs might be around 40,000 and all are not registered. However, if one considers others including floating sex workers with the figure, then, the number may be much higher than a hundred thousand.

Figure 5.2 shows the relative location of different active and currently evicted and Figure 5.3 illustrates the population size (number of sex workers) of all currently active brothels in the country. It is evident that once there were as many as 34 sex institutions in Bangladesh, of which a good numbers were currently evicted and most of the evictions were made during last ten years. In most cases, evictions were made by the local community and needless to say_ forcedly. As mentioned earlier that the ever-oldest brothel in the country named Kandupatti (established in 1790c.) had been evicted with the same manner just sometimes in 1997. Similarly, another oldest in Dhaka city, and others in Chittagong, Rangpur, Dinajpur, Madhupur, Muktagacha, Benapole, Brahmanbaria, Sirajgonj were also ousted just few years ago. However, most of the active sex institutions lay on the Dhaka-South route particularly in Faridpur, Jessore and Khulna cities. The city of Faridpur and Jessore has three brothels in each. Even Daulatdia, the second largest and the core of all, is also encountered in this route. Daulatdia is not only the place in the core of the country's geographical limits, but also maintains functional and strategic position in transport networking system in Bangladesh. These spatial contextual properties make the location overwhelming vulnerable to STD/AIDS. It is needed to note here that some

HIV positive cases among the sex workers have only been detected at Daulatdia brothel (NAC, 1991). Nowadays there is only one brothel existing in North Bengal at Saidpur. But once there were many brothels at Sirajgon, Rajshahi and other cities too. The last region of red light area is seen in the northeastern parts of the country *e.g.* in the city of Jamalpur, Mymensingh and Narayaganj. Just a few days ago the oldest brothel in the country was evicted from Dhaka City, but the sex-workers are still persisting and being scattered in numerous hidden sex-spaces over the city.

The spatiality of sex-spaces can also be seen from regional approach, the one of the core concept of geography, used as the method for classifying the spatial phenomena. It is obvious in the Figure 5.2 that the locational distribution of sex-spaces forms a spatial pattern following the river of Padma, Meghna and Jamuna as well as along the major truck routes in the country namely Dhaka-South, Dhaka-North, Dhaka-Mymensingh, Dhaka-Chittagong and Dhaka-Sylhet. The spatial pattern of the distribution of different sex-spaces can qualitatively be categorized into three distinct regions, which termed as 'Sex Region'. The qualitatively basis of such regionalization were the spatial concentration and characteristics of sex-spaces and their geographical segregation by the major rivers *viz.* Padma, Meghna and Jamuna. However, the regions are: **Region-1** includes 'Dhaka-South Roue' laying in the of south of the river Padma; **Region-2** contains 'Dhaka-North Bengal Route' laying in the north of the river Padma and along the west of the river Jamuna; **Region-3** comprises of 'Dhaka-Northeast and Dhaka-Southeast Routes' laying in the east of the river Jamuna and Meghna (Figure 5.2).

The first region covers the whole southern and southwestern districts of Bangladesh; the second one covers the northwestern districts and third one includes the routes of Dhaka-Chittagong, Dhaka-Mymensingh, Dhaka-Sylhet and covers the

rest of the parts of the country *i.e.* the whole northeast and the southeast districts of Bangladesh.

Table 5.3 **Regionalization of Sex-spaces (Formal Regions) and their Characteristics**

Sex-Region	Location	Major Routes	No. of Institutional Sex-spaces	No. of Deserted Sex-spaces	% of Hidden Sex spaces	Remarks
Region 1	South of the river Padma	Dhaka-South	13 (82%)	3 (18%)	15%	'Active Region'
Region 2	North of the river Padma	Dhaka-North	1(17%)	5 (83%)	40%	'Dead Region'
Region 3	East of the river Jamuna and Meghna	Dhaka-Chittagong-Mymensingh-Sylhet	5 (42%)	7 (58%)	45%	Mixture' and 'Hidden Region'

Note that:
The regionalization has been done on the basis of the spatial concentration of sex-spaces with different characteristics and their geographical segregation by the major rivers viz. Padma, Meghna and Jamuna.

***Sources**: (inf.)*
Column 2: Based on Figure 5.2
Column 3: Ibid.
Column 4: Ibid. and also based Table 5.4
Column 5: Ibid. and also based Table 5.4
Column 6: Based on Table 5.2

The idiosyncratic differences of these regions are also important to notice. Region 1 is characterized with largest number of sex-spaces of which except 3 all are active (nearly 82% are active) and the most geographically and functionally critical, central and accessible and also the country's second largest one (the Daulatdia brothel: Figure 5.3) is located in this region. In this respect, the region 1

can be termed as region of active institutional sex-space or 'Active Region" and thus most vulnerable to STD/AIDS. While, Region 2 had a few of 6 institutional sex-spaces whose only one is still alive (only 17%), and most of them are dead. Consequently, high percentage of hidden sex-spaces (40%) is seen in the region (Table 5.3). Thus the region can be distinguished as 'Dead region', since overwhelming presence of deserted or evicted sex-spaces though it had huge number of hidden sex-spaces. Finally, Region 3 belongs to the in-between characteristics and thus can be specified as 'Mixture Region'. It has almost an equal number of dead (58%) as well as active (42%) sex-spaces of the total of 11 number. But the most striking feature of the region is that due to unplanned eviction of institutional sex-spaces, the region has gone severely prone to hidden sex-spaces. The highest number of (45% of the total) hidden sex-spaces are seen prevailing in the region in which Dhaka City has already been flooded with. Eventually the region may also be labeled as 'Hidden Region'.

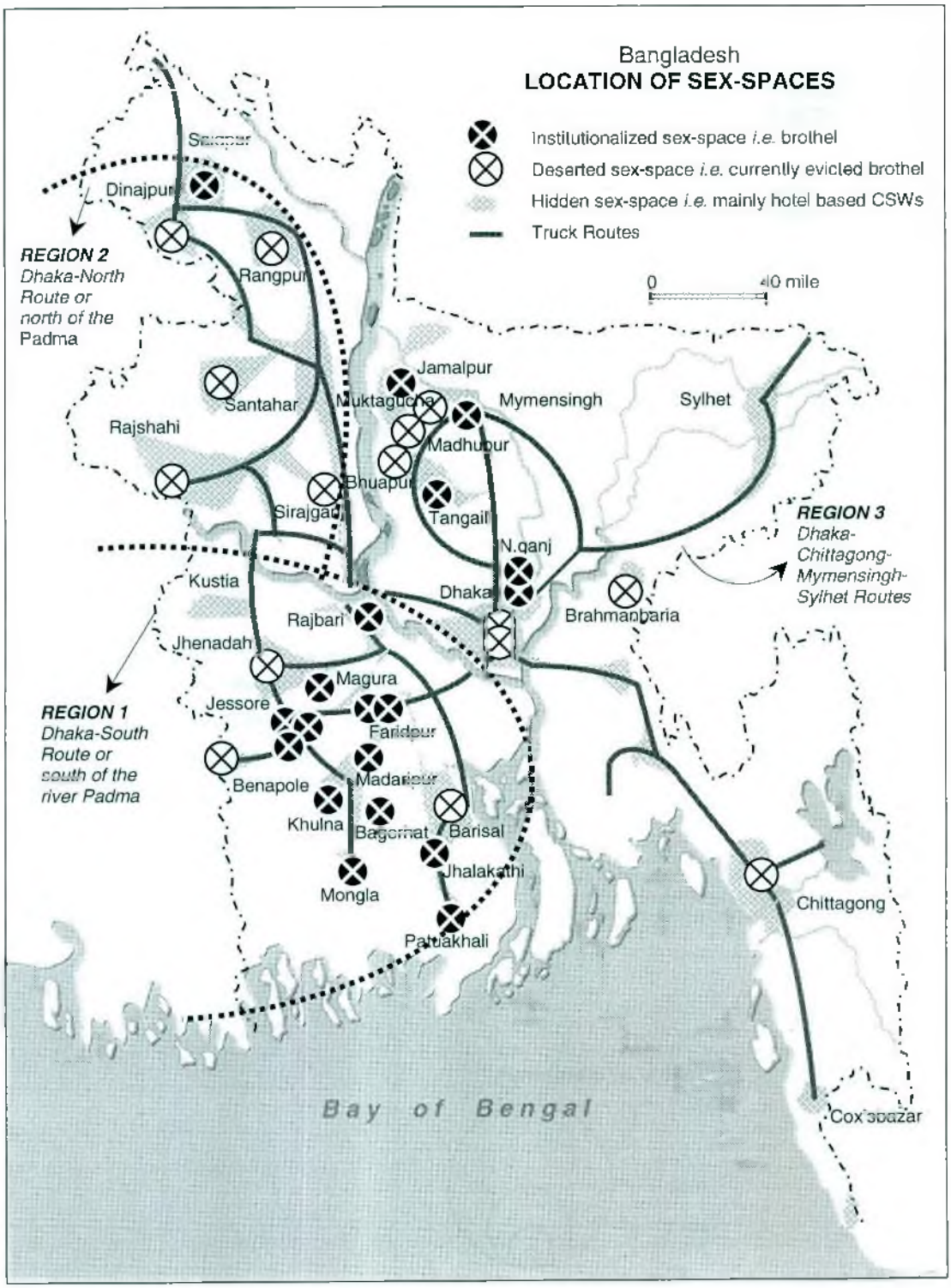
In geography, a formal region is a geographical area, which is uniform or homogeneous in terms of selected criteria (Grigg, 1967). Thus the above regions are formal in nature, since they all are concerned with uniformity and defined according to the homogeneity within their geographical limit. The criterion set for this regionalization was that of the spatial concentration of different typed sex-spaces and their geographical segregation by the major rivers *viz.* Padma, Meghna and Jamuna. The regionalization of sex-spaces, however, will provide an insight of the spatiality of sex-spaces, yet with lacks for the understanding of functional interrelationships between the sex-spaces. The formal regionalization of sex-spaces does provide the functional coherence. Thus the functional regionalization is needed so that sexual networking between different sex-spaces can be understood. However, these regions are also explored in the flowing sections.

Table 5.4 **List of the Red Light Areas (Brothels) in Bangladesh**

No.	Name of the Brothels	Location (Origin District)	Size
1	Bagerhat	Bagerhat	500
2	Puranbazar	Barisal	Evicted
3	Brahmanbaria	Brahmanbaria	Evicted
4	Chittagong	Chittagong	Evicted
5	Sadarghat	Dhaka	Evicted
6	Kandupatti, English road	Dhaka	Evicted
7	Dinajpur	Dinajpur	Evicted
8	Shariatullah bazaar	Faridpur	500
9	C & B ghat	Faridpur	300
10	Madaripur	Faridpur	600
11	Dyamayapara	Jamalpur	500
12	Jhalaipatti	Jessore	500
13	Churipatti	Jessore	500
14	Mayra Mandir	Jessore	1500
15	Benapole	Jessore	Evicted
16	Jhalakathi	Jhalakathi	50
17	Jhinaidha	Jhinaidha	Evicted
18	Fultala	Khulna	1500
19	Magura	Magura	500
20	Baniashanta	Mongla	1000
21	Ghanginarpar	Mymenshingh	500
22	Muktagucha	Mymensingh	Evicted
23	Santahar	Naogan	Evicted
24	Tanbaza	Narayanganj	15,000
25	Nimtala	Narayanganj	5,000
26	Syedpur	Nilfamari	600
27	Natunbazaar	Potuakhali	400
18	Ferry ghat, Daulaldia	Rajbari	5,000
39	Rajshahi	Rajshahi	Evicted
30	Rangpur	Rangpur	Evicted
31	Sirajganj	Siraganj	Evicted
32	Madhupur	Tangail	Evicted
33	Baby stand	Tangail	3, 000
34	Bhuapur	Tangail	Evicted

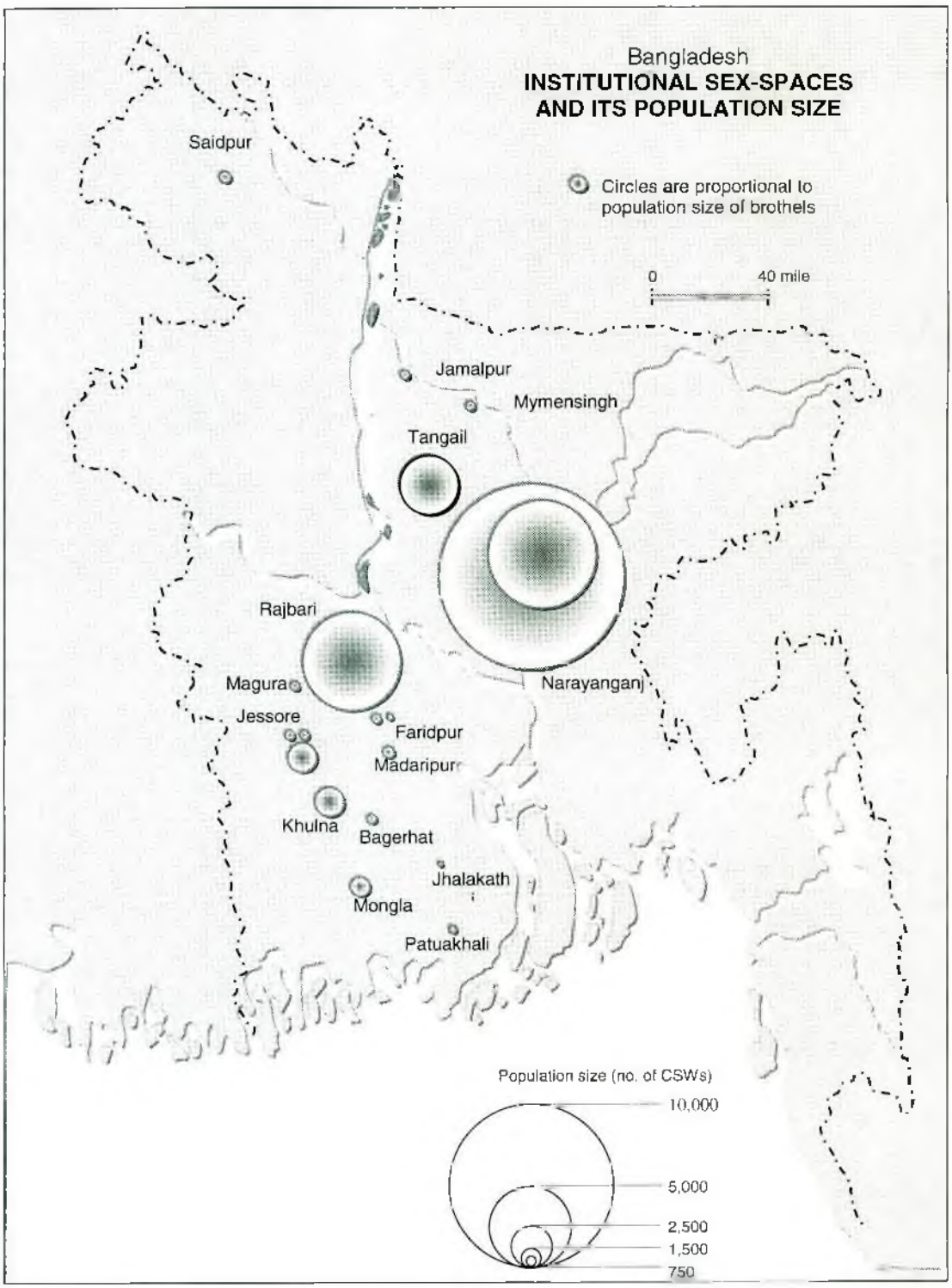
Source: *Field Survey, 1997*

Note: *Data were collected from the discussion with the respondents and other key informants. However necessary correction and validation was also done through cross checking and measuring up with the available secondary sources.*



Source: *Field Survey, 1997*

***Figure 5.2**. Spatial distribution of truckers' sex-spaces (both institutional and hidden). The figure also shows the three formal sex-regions in the country. Notice that both the sex-spaces and their regions are predominantly lies along the major truck routes in Bangladesh.*



Source: *Field Survey, 1997*

Figure 5.3 *Spatial distribution of recognized brothels (institutional sex-spaces) in the country and the population size (number of sex workers) of each brothel as recorded in the field survey of the present study (vid. Table 5.4).*

5.3 Spatial Aspects of Risk Networking between Sex-spaces

5.3.1 Spatiometric Risk Networks

The previous section deals with the epidemiological concept of sexuality into spatial frame naming as sex-space and shows its nature and spatial distribution pattern in general. This section reflects on another emerging epidemiological concepts regarding risk for or vulnerability to STD/AIDS namely "Egocentric Risk Networks"_ those whom a subject engages directly in risk behaviors; and "Sociometric Risk Networks"_ composed of patterns of relationships involving risk behaviors among large number of members of a group (*vid.* Chapter 3). Similarly, these concepts can also be seen from geographical perspective and thus attempt has been made to fit the concepts into spatial framework. Two questions need to think about_ first, what is the practical relevance of this attempt and second, how this can be made fit for spatial analysis. However, as to general uses of sociometric network concept, epidemiologists usually argue that sociometric risk networks structure the flow of infectious agents in the communities for interrupting such flow. Individuals' locations in such networks may determine the proportion of their contacts, who are infected and thus may help to determine their own probability of becoming infected. Sociometric network location, therefore, can define an aspect of STD/HIV risk that can not simply be reduced to the amount of high-risk behaviors in which an individual engages. Network technique, for example, might explain why certain community has found to be significant predictor of STD/AIDS infection, even when risk behaviors are controlled (Friedman *et al.* 1997). Similarly, it has already evident and thus argued that risk networking are found to be attributed to some sex-spaces and therefore sex networking can also be seen from spatial point of view. To do this the term 'Spatiometric Risk Network'_ meaning sexual risk networking between different sex-spaces through its clients like truckers_ was introduced (figure

5.4). These are actually nothing but rational conversion of epidemiological concept into geographical frame. Thus similar to that of epidemiology, spatiometric networks can provide a structural model for analyzing the probability of becoming infected with STD/AIDS of certain places or routes or can be used to explain how some locations become vulnerable to STD/AIDS for certain community involved in the risk networking. This also important for spatial planning and developing follow-up system for effective intervention for mobile community like truckers. Finally, as to the second question, *i.e.* how is it possible to translate the risk networking concept into spatial frame, the following sections are designed in which the process of spatial networking is shown in details.

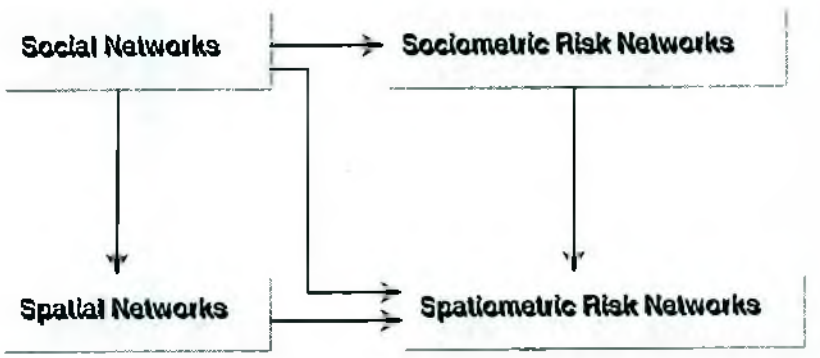


Figure 5.4 *The concept of Spatiometric Risk Networks and its origins. Originally the concept derived from the chore of sociology, from where it turns to epidemiology as an analytical frame to study risk networks among the high-risk groups and to assess their risk for HIV/AIDS. In the present study simply spatial dimension has been incorporated along with social as well as epidemiological concepts of sociometric risk networks and accordingly termed the concept for geographical analyses. Note that studying spatial networking or in other words spatial interaction, such as in rural-urban interaction, describing and analysis of transport networks etc. is nothing new at all, especially in different branches of human geography.*

In geography, network analysis is often performed in few of its branches. Several techniques are seen especially in transport geography to be used for description of networks. While the epidemiologist consider as an analytical model and go on with highly critical and mathematical way (*vid.* Chapter 3). The spatial characteristics of risky sexual networks can effectively be described and analyzed in the manner with the graph-theoretic algebraic techniques that rarely used by the geographers. This techniques include making topological graph to high-level matrix algebra, matrix indices, areal algorithms *etc.*

5.3.1.1 'Binary Connectivity Matrix' of Sexual Networks

A simple topological graph can be developed for any network and symmetrically for sexual risk network to characterize the individual vertices or nodes of the network. Such a graph of risk network, on the other hand, can also be represented mathematically by 'Binary Connectivity Matrix' in which each row and column represents a vertex or node. In the present study, institutional sex-spaces are considered according to their locational identity, *i.e.* origin district. Thence a brothel or an intact cluster of brothels is considered as singular one or as a risk node. In due course though namely two brothels in Narayanganj, but accounted as a single sex-space, then, as a single risk node by the name of its origin district *i.e.* "sex-spaces of Narayanganj". This was done for being convenient in computation and also for the lack of necessary data. Thus the total of 19 countrywide active brothels is grouped into 14 sex-spaces (*cf.* Table 5.4 for the list of all brothels in the country and Table 5.5 for sex-spaces). The presence or absence of a direct link between any two nodes on the network may be a cell entry '1' or a '0'. One should notice how the matrix is systematical about the diagonal from top left to bottom right. Thus, for example, in the matrix Table 5.5 the link from A to D is shown along the Row A

where it crosses Column D, and is also repeated in the Row and D Column A. This therefore, represents a link both from A to D and from D to A (Matrix Table 5.5 and 5.6).

However, in the matrix (both in the Table 5.5 and 5.6), a total of 15 nodes is shown. These are all individual institutional sex-spaces including the shaded cells, which represent the anonymous and numberless hidden sex-spaces. The matrix Table 5.5 also shows the direct links between different nodes. The column of the extreme right shows the row total as well as the column total and the grand total are given in the bottom row. A total of row value of 15 means each node is connected by the all nodes of the respective row. The N-th row of both Table 5.5 and Table 5.6 shows the summation of total links between different nodes. The Node N represents the unknown or hidden sex-spaces, which is connected with all other formal sex-spaces and even with itself. For that reason crossing point of column vector over row vector in this section is presented with 1 in parenthesis. While in other cases, the diagonal cells or crossing points are shown with a hyphen (-) meaning that not applicable (NA) or impossibility of being linked, since a node can not be linked by itself.

It is however estimated that maximum 183 single links can be existed between all of 14 institutional sex-spaces in Bangladesh, since mathematically 14X14 equals to 182, but in practice all node were not found to be linked-up by each others'. Nevertheless, a total of 143 links were observed which means high rate of inter-nodal linkages (0.76%) was prevailing between the institutional sex-spaces. This rate in turn indicates the high average degree of connectivity of each node in particular as well as average degree of connectivity between all nodes in general. Therefore, the nodal connectivity is needed to know in details, which discussed in the next section.

Table 5. 5 **Binary Matrix of Risk Networking between Different Sex-spaces**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	Σ
Bagerhat **(A)**	-	1	0	0	1	1	1	1	0	0	0	1	1	0	1	8
Faridpur **(B)**	1	-	1	0	1	1	1	1	1	0	1	1	0	1	1	11
Jamalpur **(C)**	0	1	-	0	1	1	0	1	1	1	0	1	1	1	1	10
Jhalakathi **(D)**	0	0	0	-	0	0	0	0	0	0	0	0	0	0	1	1
Jessore **(E)**	1	1	1	0	-	1	1	1	1	1		1	1	1	1	12
Khulna **(F)**	1	1	1	0	1	-	1	1	1	1	1	1	1	1	1	13
Magura **(G)**	1	1	0	0	1	1	-	1	1	0	1	1	1	1	1	11
Mongla **(H)**	1	1	1	0	1	1	1	-	1	1	1	1	1	1	1	13
Mymensingh **(I)**	0	1	1	0	1	1	1	1	-	1	0	1	1	1	1	11
Narayngani **(J)**	0	0	1	0	1	1	0	1	1	-	0	1	1	1	1	9
Patuakhali **(K)**	0	1	0	0		1	1	1	0	0	-	1	1	0	1	7
Rajbari **(L)**	1	1	1	0	1	1	1	1	1	1	1	-	1	1	1	13
Saidpur **(M)**	1	0	1	0	1	1	1	1	1	1	1	1	-	1	1	12
Tangail **(N)**	0	1	1	0	1	1	1	1	1	1	0	1	1	-	1	11
Unknown **(O)**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	(1)	15
Total	8	11	10	1	12	13	11	13	11	9	7	13	12	11	15	157

Source: *Questionnaire Survey, 1997*

Links with unknown places.

Unknown: *hidden sex-spaces include hotel based/street girls and other floating CSWs etc.*

0 = No link between sex-spaces
1 = Link exists between sex-spaces

Total currently linked-up institutional sex-spaces in the country = 14

N.B. *institutional sex-spaces are considered according to their locational identity, i.e. origin district. Thence though there are two brothels in Narayanganj, but considered as a single sex-space by the name of its origin district. This was done for being convenient in computation and also for the lack of necessary data. Thus the total of 19 countrywide active brothels was grouped into 14 sex-spaces.*

Observed number of links between all institutional sex-spaces(O) =(157–14)143*

Expected number of links between all institutional sex-spaces(E)=[(14x14)-14]=182*

Average degree of connectivity between all institutional sex-spaces (O/E) = 0.76

N.B. *a sex-space can not be linked by itself, and since the number of institutional sex-spaces is 14, then the sum of 14 has been subtracted from the total value.*

Table 5.6 **Frequency of Risk Networking between Different Sex-spaces**

From \ To	Bagerhat	Faridpur	Jamalpur	Jhalakathi	Jessore	Khulna	Magura	Mongla	Mymensingh	Narayanganj	Patuakhali	Rajbari	Saidpur	Tangail	Unknown	Total
Bagerhat	-	3			3	5	3	4				4	1		3	26
Faridpur	3	-	1		6	4	4	6	1		**4**	10		2	2	43
Jamalpur		**1**	-		2	4		3	8	7		2	2	7	11	47
Jhalakathi				-											15	15
Jessore	3	6	2		-	5	3	6	3	**1**		9	8	2	5	53
Khulna	**5**	4	4		5	-	4	**12**	5	1	3	11	9	6	4	73
Magura	3	4			3	4	-	6	2		1	7	3	2	4	39
Mongla	4	6	3		6	**12**	6	-	5	1	2	11	10	5	2	73
Mymensingh		1	**8**		3	5	2	5	-	**8**		2	7	**9**	12	62
Naraynganj			7		1	1		1	8	-		7	3	6	31	65
Patuakhali		4				3	1	2			-	3	1		13	27
Rajbari	4	**10**	2		**9**	11	**7**	11	2	7	3	-	**13**	2	19	100
Saidpur	1		2		8	9	3	10	7	3	1	**13**	-	6	26	89
Tangail		2	7		2	6	2	5	**9**	6		2	6	-	7	54
Unknown	3	2	11	15	5	4	4	2	12	31	13	19	26	7	(260)	414
Total	26	43	47	15	53	73	39	73	62	65	27	100	89	54	414	1180

Source: Questionnaire Survey, 1997

Unknown: *hidden sex-spaces include hotel based/street girls and other floating CSWs etc.*

■ *Highest 'r ' value in each column*

Links between unknown sex-spaces. Since the location of these spaces is not known, thence not taken into account for areal grouping or regionalizing procedure

Total frequency of links between all sex-spaces = 1180

Total frequency of links between all hidden sex-spaces = 260
Total frequency of links between all institutional sex-spaces = (1180-414) 766
Total frequency of links between all institutional and hidden sex-spaces = (414-260)154

*Average links between all sex-spaces during last three month = 1180÷ 15 = 78.67**

N.B. ** Note that this figure is a base value (or national average) of truckers' sexual networking for a period of three months.*

Table 5.7 **Indices of Connectivity or Contactability between Different Sex-spaces**

Sex-spaces	Linked Node (V)*	Single Links (L)	Total Links ((T)	Connectivity Indices			Degree of Connectivity (%)		Hierarchy : Accessibility and Centrality
				β	γ	θ	χ	χ^2	
Bagerhat **(A)**	9	8	26	0.89	0.38	2.89	57.14	33.05	13
Faridpur **(B)**	12	11	43	0.92	0.37	3.58	78.57	54.66	10
Jamalpur **(C)**	11	10	47	0.91	0.37	4.27	71.42	57.20	9
Jhalakathi **(D)**	2	1	15	0.50	0.0	7.50	7.14	19.07	14
Jessore **(E)**	13	12	53	0.92	0.36	4.08	85.71	67.37	8
Khulna **(F)**	14	13	73	0.93	0.36	5.21	92.85	92.79	4
Magura **(G)**	12	11	39	0.92	0.37	3.25	78.57	49.57	11
Mongla **(H)**	14	13	73	0.93	0,36	5.21	92.85	92.79	4
Mymensingh **(I)**	12	11	62	0.92	0.37	5.15	78.57	78.81	6
Narayngani **(J)**	10	9	65	0.90	0.37	6.50	64.28	82.62	5
Patuakhali **(K)**	8	7	27	0.87	0.39	3.37	50.00	34.32	12
Rajbari **(L)**	14	13	100	0.93	0.36	7.14	92.85	127.11	2
Saidpur **(M)**	13	12	89	0.92	0.36	6.84	85.71	113.13	3
Tangail **(N)**	12	11	54	0.92	0.37	4.50	78.57	68.64	7
Unknown **(O)**	15	15	414	1.00	0.38	27.60	100	527.24	1

Note: *each node is linked with several nodes, e.g. Bagerhat, for example, linked with 8 nodes, thus in the row of Bagerhat, the number of total single linked nodes will be 8+1(1 for Bagerhat) = 9*

1. $\beta = \frac{L}{V}$ *Where, L = presence of single link (either 1 or 0)*
   V = vortex/ node
   The index value of exactly 1.00 indicates the presence of complete circuit of sexual network i.e. each node is connected by each other's.
2. $\gamma = \frac{L}{3(V-2)}$ *Where, L = presence of single link (either 1 or 0*
   V = vortex/ node
   In this case the connectivity index always lies between 0.00, for no links to 1.00 complete graph of sexual network i.e. each node is connected by each other's.
3. $\theta = \frac{T}{V}$ *Where, T = total links of each node*
   V = vortex/ node
   In this case, total links indicate the frequency of sexual links for a given node. i.e. Bagerhat, for example, has single link with 8 nodes as well as has total of 26 links with the same nodes.

$$\chi = \frac{L_i}{\{X_{i(1-n)}\} - 1} \times 100 \qquad \chi^2 = \frac{\Sigma L_i}{\Sigma \bar{x}} \times 100$$

L_i = *observed presence of links for each node e.g. 8 for Bagerhat;*

X_i = *expected single links for each node =15; and since an individual location can not be connected by itself, therefore 1 is subtracted from the expected total single links of each node, then, expected total single links = 15-1=14;*

ΣL_i = *summation or total frequency of observed links for each node, e.g. 26 for Bagerhat;*

Σx = *expected total or average links of each node, which can be obtained through multiplying the total links of all nodes with the number of total nodes, then, 1180 ÷ 15= 78.67*

5.3.1.2 **Connectivity or Contactability**

The network matrix can also be used to characterize the individual vertices *i.e.* whither the individual vertices or nodes are completely or partly connected with other nodes of the matrix. Kansky (1963) provided a number of indices that can be used for this purpose. These are *Beta* Index *(β)*, *Gamma* Index *(γ)*, *Theta* Index *(θ) etc.* Originally, these indices have been used for describing the structure of network graphs. In the present analyses the insight fundamental principles of the indices rather have been used and readings have been taken directly from connectivity matrix instead of making graphs and taking readings from there. These indices mainly describe the degree of individual vertices or nodes and all the three indices are used here to have a relative picture of connectivity of each node from different angle of methods. The index value of β mainly describes the mean number of single links associated with the node and also shows the connectivity pattern of the networks. While γ compares the actual number of links (single link *i.e.* presence or absence of link) with the maximum number of possible for given node. So the maximum value of gamma index approaches the optimal connectivity. Theta (θ) index describes the mean number of total links associated with individual nodes.

In the Table 5.7 details of graph-theoretic algebraic procedure for determining the connectivity of deferent sex-spaces has been analyzed and interpreted. First column indicates different sex-spaces in the country as individual node. Second column is developed instead of making graphs for each node. Each node is linked with several nodes, *e.g.* Bagerhat, for example, linked with 7 nodes, thus in the row of Bagerhat, the number of total single linked nodes will be 7+1 (1 for Bagerhat) = 8. Similarly, in other cases too, 1 is added with total single links of respective sex-spaces. Column three and four have derived from the Table 5.5 and 5.6 in which

total of single links and frequency of total links have shown respectively. Column five shows several Kanskean (1963) connectivity indices value. It is apparent in the Table 5.7 that the different indices produce different values for same node. This is because of the differences in principle of different indices. In the beta indexing only unknown sex-space (O) is shown for complete graph *i.e.* completely connected, while Jhalakathi is recognized as null graph by the gamma analysis. The theta index shows the actual picture of the degree of each node except Jhalakathi with high Theta value. This high value does not indicate the nodal importance of linkages; rather it makes the fact that few links but high frequency of linkage characterizes the location. The different results of different indices are somewhat confusing and problematic for further analyses. Thus alternative measure is required to have comparative picture of the degree of connectivity of each sex-spaces. Therefore, the last three columns were developed as alternative measure of these indices and used for determining the hierarchic order of connectivity of different nodes as well as the, accessibility and the centrality of the whole.

5.3.1.3 **Accessibility and Centrality**

Since the matrix is used to characterize the degree of individual vertices, then with the help of matrix algebra accessibility of individual vertices or nodes within the network can also be examined. The degree of a vertex, as mentioned earlier, is the number of links incident at that vertex or node. The row total records the degree of each node. In the matrix Table 5.7 the presence or absence of intervening link between two nodes is expressed in terms of the binary number of 1 and 0 respectively. The low sum of index value of both χ and χ^2 for each node provides a measure of relative accessibility. The respective value of the degree of connectivity all nodes were arranged according to their hierarchic order, which is shown in the

rightmost column of the Table 5.7. The highest connectivity value is assigned to the foremost one in the hierarchic order, which in turns determines the most accessible as well as the most central of all. In short, the rule is that the more central, the more accessible; the more accessible, the more connectivity. Conspicuously, the Node O is the most accessible in terms of its hierarchical rank. But since the Node O attributes to unknown sex-spaces, then, the Node L (Rajbari) is also identified in terms of its hierarchical order as the second most accessible among all sex-spaces and as the topmost amongst the institutional sex-spaces in the country. While Node D (Jhalakathi) is found to be the least accessible as well as peripheral in the country.

Similarly, connectivity matrix can also be used to examine the centrality of different nodes. Especially the value of χ^2 of a node provides the measure of its relative centrality. The highest degree of connectivity, as per rule mentioned above, indicates the most central. Thus over and again Node O is in the most central, but not considered, since its actual geographical location was unknown and was not recorded. Therefore, once again Node L (Rajbari) is shown in the most central of all institutional sex-spaces in Bangladesh. In fact, Rajbari, the second largest brothel (*vid.* Figure 5.3), is not only the most accessible and central in terms of it highest degree of sexual networking, but also the most accessible and central in terms of its core location in the country's transport network system and even from true geographic perspective of Bangladesh.

5.3.1.4 **Areal Algorithm: Risk Regionalization and Spatial Order**

In an earlier section, sex-spaces were categorized as several formal region, which are uniform or homogeneous in terms of selected criteria and argued that those regionalization event though provides an insight into the spatiality of sex-spaces, yet lacks with the understanding of functional interrelationships between the

sex-spaces. Thus sexual networking between different sex-spaces needs functional regionalization so that their spatial pattern could be established. A functional region is a geographical area, which displays a certain interrelationship, an interdependence of parts, and defined on the basis of functional coherence. This sort of regions is sometimes referred to as a nodal or polarized region and may be composed of heterogeneous units, but must be functionally interrelated. (Grigg, 1967).

Keeping this in mind, finally, linkage analysis was done to understand the spatial pattern of association *i.e.* areal grouping of sexual networks. The technique of linkage analysis was first developed by McQuitty (1957) to give a quantitative measure of similarity between variables. When the variables to be grouped are geographical areas, then linkage analysis becomes an algorithm for areal grouping or regionalizing (Norcliffe, 1977). Thus the technique can be used to illustrate the regions of risk networks. To do this Table 5.6 was developed in which total frequency of sexual links between different truckers' sex-spaces in the country were tabulated. Following the McQuitty's method, the general procedure of areal grouping for risk regionalization is given hereinafter.

- The column vectors of the network matrix (of Table 5.6) were scanned thoroughly and highest cell value in each column was identified and marked, *e.g.* Value 5 is marked as highest for Column Bagerhat, and Value 10 for the Column Faridpur, and so on.
- Then, the largest cell value in the entire matrix was searched. This value links two variables, which form a "Reflective Pair" and consequently become the core (termed as *K*-core) of Group 1. In the Matrix Table 5.6 the largest value is 13, which links Rajbari (L) and Saidpur (M). Thus L and M are the members of the reflexive pair *i.e.* they are reflexive to each other (Figure 5.5).

- The procedure now switches to row vectors. Scanning of rows corresponding to both members of the reflexive pair was made and nothing found in the row of M, but three other marked values were found to be encountered the reflexive pair in the row of L *e.g.* value of 10, 9, and 7 respectively. Therefore, these values in the column concerned are linked and joined the group 1 by the row variables *i.e.* Faridpur, Jessore, and Magura joined the group 1 through Rajbari. If a member is added to a group in this way, the row for the new group member is then searched and further marked values are encountered, then these variables are added to the group and their respective rows are searched. This continues until all linking routes of a group lead to rows in which no marked values are encountered.
- After completing the first group the next highest cell value in the matrix that not yet assigned to a group is identified *e.g.* value 12, and this becomes a new reflexive pair *e.g.* Khulna and Mongla. Other steps are then repeated, and so on for successive reflexive pairs until every variable is assigned to a group.

Following the above procedure, regionalizing of sex-spaces was made. For example, first the rows of reflexive pair for the first group searched. The only marked value in the Row Rajbari is Saidpur, the other member of reflexive pair. In Row Rajbari three marked values are encountered for Magura, Jessore, and Faridpur respectively and join the group 1 through Rajbari. Switching to three Rows Faridpur, Row Jessore, and Row Magura, a marked value is found in the row of Faridpur for Patuakhali and this join the group 1 through Faridpur. There are no other marked values in other two rows of Faridpur and Jessore. So, Group 1 is complete. Similar algorithm was made in forming other areal groups. Thus a total of four groups were identified (Figure 5.5). Of these three groups all have reflexive pairs and associated

with other members. While Group 4 is completely dismembered and forms an isolated group.

These groups, except group 4, however, are not disconnected, rather each group is sexually linked up with other groups in different degree, which is also randomly hinted at the figure 5.5. For example, Rajbari, the core member of Group, was found linked with 12 nodes including the all members of its own group as well as members of other groups, even also with several unknown places (Table 5.6). Similarly, Saidpur was linked with 11 (excluding unknown places); Jessore with 11; Magura with 10; Faridpur with 10, and Patuakhali with 6 nodes. Thus a total of 60 nodes excluding unknown places was linked (note that single links, the total frequency of links was higher) with Group 1. Analogously, Group 2 had a total of 31; and Group 3 had a total of 37 links. While Group 4 was not only dismembered, but also unlinked with other groups except some links with unknown places (Table 5.6). Thus except Group 4 all other groups are to some extent spatially integrated to each other's.

Figure 5.5 shows some important characteristics of different risk network groups. In the figure, first three groups have 6 reflexive pairs *viz.* Rajbari (L) and Saidpur (M) for group 1; Khulna (F) and Mongla (H) for group 2; and Mymensingh (I) and Tangail (N) for group 3 respectively. The last group (group 4) is dismembered and hence it has no reflexive pair. These are indeed the cores of the respective groups. However, following some matrix algebra an attempt has been made to understand the quantitative measure of spatial magnification or diameter of risk network as well as the most accessible and central location of each group. First, the network grapes can be described by means of its diameter (δ) that involves the counting of the number of arcs in the shortest possible path between the two farthest points (x - y) on the each network group (after Kansky, 1963). As the size of the

graph increases so, in general does the diameter, although as Kansky pointed out that the progressive inclusion of connecting arcs causes the diameter to decrease where numbers of nodes is fixed. Therefore, the diameters of all groups remain same (Figure 5.5). However, this counting gives some idea of the spatial spread of a network. The measurement related to accessibility and centrality of each group. This has been done with the help of the König Numbers. German Mathematician Denes König first developed this numbering system in 1936 (Davis, 1977). The centrality of nodes on a network may be stated in terms of their König Numbers. Node L (Rajbari), Node F (Khulna), Node I (Mymensingh), have the lowest König number and thus these locations are the most central in their respective groups. However, these locations are also the most accessible in respective groups, since every arc of each group linked with these central nodes of same groups.

Table5.8 **Regionalization of Sex-spaces (Functional Regions) & their Characteristics**

Groups	No. of Members	*K*-core	Diameter (δ= x - y)	Accessibility & Centrality ($_k$)	Total $_1$ Links	Regional $_2$ Risk Value	Remarks
Group 1	6	L↔M	2	K ($k=1$)	60	0.74	1st. order Vulnerable
Group 2	3	H↔F	2	F ($k=1$)	31	0.73	2nd. order Vulnerable
Group 3	4	I↔N	2	I ($k=1$)	37	0.72	3rd. order Vulnerable
Group 4	1	None	0	Null graph ($k=0$)	34	0.19	Isolated, and less Vulnerable

Note 1: *included links of a group with other members of all groups, but excluded the links with unknown places.*

Note 2: *Based on average regional contactability (Table 5.7 and Table 5.9)*

The geographical placing of the formal regions of sex-spaces are found to be somewhat analogous to that of areal groups of sexual networking (*cf.* Figure 5.2 and Figure 5.18). It is obvious in the Figure 5.2 that the locational distribution of sex-spaces shows distinct spatial pattern following the river of Padma, Jamuna and Meghna and also along the three major truck routes namely Dhaka South, Dhaka-North and Dhaka-Northeast and Southeast, then the sex-spaces have been categorized into three perceivable formal sex-regions. Similarly, areal groupings of sexual networking *i.e.* the functional regions are also located in same geographical tracts. This is because of the definite location of the different institutional sex-spaces. However, there are some internal differences. One of such is that except a small fraction laying in the north, the southern formal region (*e.g.* 'Active Region' of Figure 5.2) is dissected into 3 functional regions. This dissection clearly indicates the significant variation in networking as well as existence of high sexual networking within this region, which covers the whole southern districts of Bangladesh. (Figure 5.18). It is also evident that of the total four functional regions, three are seen on the north and south routes, and of them, two are with high level of vulnerability. This in turn indicates the intense spatial interaction existing between South and North Regions (*i.e.* functional integrity between formal regions of Active Region and Deserted Region). The third functional region is located in the eastern part and along the Dhaka-Mymensingh route. However, in general, there is a uniform coherence of sexual networking was seen between different nodes of a region as well as between different regions, which indicates the existence both intra-regional and inter-regional functionality (Figure 5.5). Thus the functional coherence of these regions are also spatially integrated, which apparently may leads one towards think about the probability of spatial diffusion of sexually transmitted diseases and also about the potentials of spatial strategy for STD/AIDS interventions.

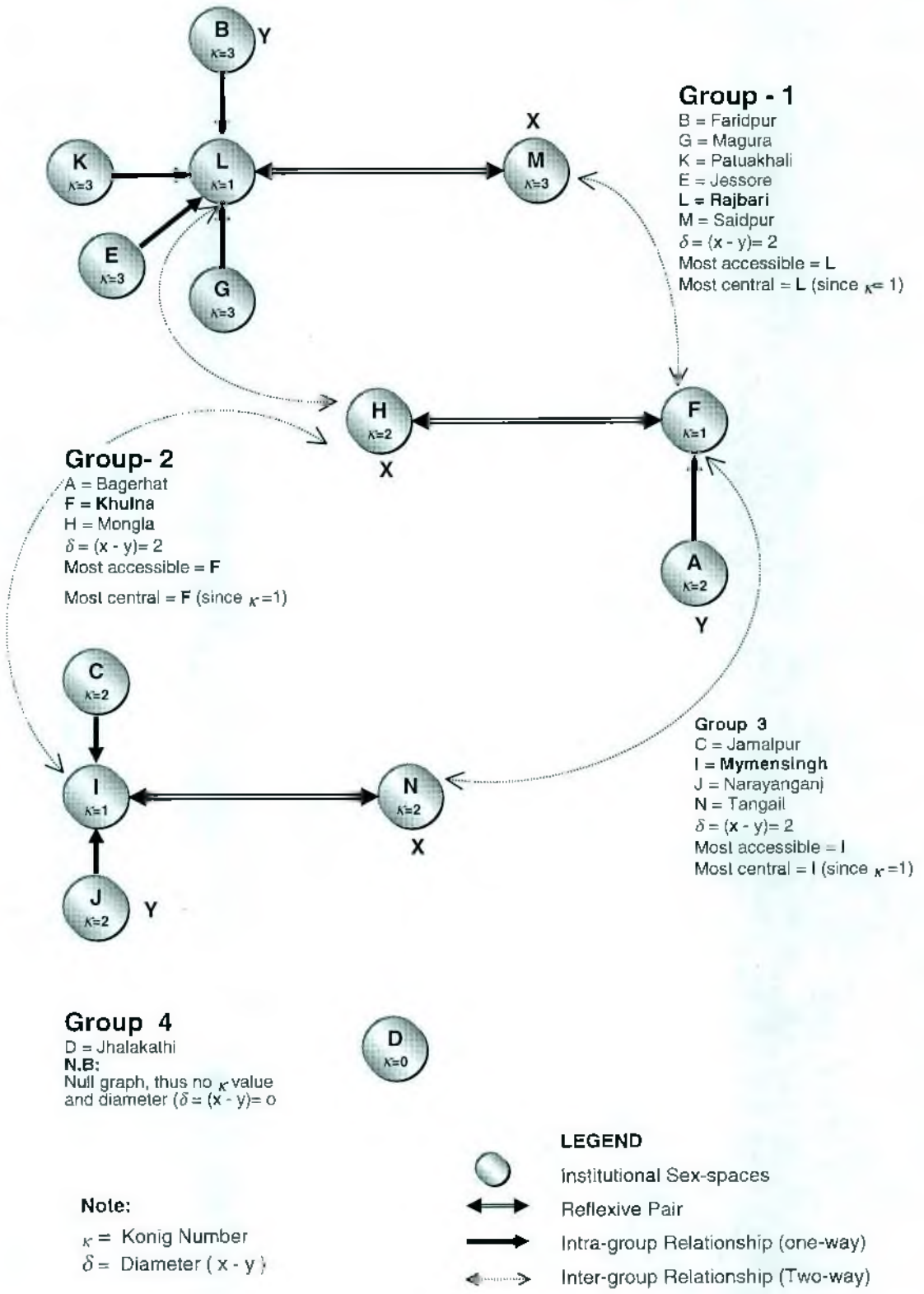


Figure 5.5 *Areal algorithm and grouping for risk regionalizing. Figure also shows the spatial hierarchy with Konig Numbers (κ) as well as the diameter (δ) of each group.*

5.4 Prediction of Spatial Diffusion of STD/AIDS

5.4.1 Simulation of Possible Directions

The previous section shows the spatiometric risk networks among the truckers, which consecutively as hinted earlier, can be utilized in simulation of future spatial diffusion pattern of STD/AIDS among the said community. Geographers have long been concerned with the concept of spatial diffusion. The most well known work was carried out by the Swedish geographer Torsten Hägerstrand (1968) who's empirical studies went on to suggest how a general operational model of the process spatial diffusion could be built and his works was essentially concerned with simulating spatial processes of diffusion. The basic assumption of the distance biased net model is that spatial development of diffusion process occurs by the expansion of new adopters around the original one, *i.e.* diffusion proceeds through 'neighborhood effect'. Thus the probability of a potential adopter is inversely proportional to the geographic distance between the adopter and the original one (Brown, 1968; Haggett, 1975 and 1990). Near the origin the probability of contact will be strong, and progressively weaker with the increase of distance. The spatial pattern of this contacts is called 'contact field', which Hägerstrand translated into an operational tool termed as 'Mean Information Field' or MIF *i.e.* an area or field of contact in which contact could occur.

Hägerstrand estimated the probabilities of each cell of MIF from an analysis of migration and telephone traffic data of central Sweden. Probability of contact was highest in the central of the MIF and declined exponentially to the distant cells. In each time period (t_0, t_1, t_2 t_3...t_n) the MIF was placed over each origin cell so that the center cell of the grid correspond with the origin cell.

However in the present study, the basic principles of Hägerstrand's model was flowed with some modification as per the practical needs of the research. **First**,

the geographic location was replaced with imploded location *i.e.* in terms of network hierarchy (Figure 5.6). Distance can be measured as of Hägerstrand used in his model, in actual geographic terms, but here distance has been measured in terms of network hierarchy. Since the truckers sexual contacts between different brothels is not inversely proportional to actual geographic distance, rather directly related to the trip pattern and frequency. Thus though Tangail is closer to Dhaka but so far in terms of imploded location than that of Chittagong or Saidpur. Similarly, Saidpur is far way from Dhaka in terms of true geographic location, but closer in terms of imploded location. **Second**, the contact filed was considered here with total number of active brothels (institutional sex-spaces) in the country and termed as 'Mean Risk Field' or MRF_ an area, or field, in which sexual contact could occur and hence chance of STD/AIDS infection (Table 5.9). Note that hidden sex-spaces are not considered. Probabilities of each cell of MRF therefore estimated from an analysis of spatiometric risk networks of trucker community. Especially the degree of connectivity index (χ^2) of each institutional sex-space was used to determine the MRF. This index in fact is related to trip pattern of truckers. Thus the nature of MRF is rather realistic than that of Hägerstrand model, which based on random numbering. **Third**, the trip pattern of truckers suggests that wave or expansion type of diffusion is not possible. Truckers' frequency of movement exclusively depends on the importance of the routes or nodes and thus it turns to a hierarchical pattern and eventually hierarchical sexual networks. Therefore, spatial diffusion of STD/AIDS through truckers should look upon from the hierarchic point of view, which geographically term as 'cascade diffusion' implying a process splashing step by step down. Even probability of being infected with STD/AIDS is not a random phenomenon; rather the disease passes on through communicable channel. In this sense, though STD/AIDS is infectious in nature, but it infection process is not analogous to those ordinary contagious

diseases. Rather it predominantly is being transmitted through sexual networking. Hence hierarchic order in sexual networks is important predictor of STD/AIDS diffusion. Finally, one limitation should note here that MRF is the mean of three months' data, though not considered for due reason, but the mean of at least one-year data would positively be more pragmatic in this case. But it was possible for practical reason that also explains elsewhere in the thesis.

Figure 5.6 *shows how geographic location turns into imploded location. Examples are provided in the text.* (after P. Haggett, *"Geography: A Modern Synthesis"*, 2nd Ed., NY: Harper & Row, 1972. p.330)

Drawing on the above modifications of the original Hägerstrand's model, now it seems appropriate to explain the elements of the proposed scheme of MRF and how it was put into use for the purpose of simulating the future pattern of spatial diffusion of STD, especially AIDS in different institutional sex-spaces of the country through the trucker community. The flow chart of Figure 5.7 shows the main elements to simulate spatial diffusion of STD/AIDS in a simplified way of linear algorithm. The elements are including locating STD/AIDS origin; developing Mean Risk Field (MRS); Assigning connectivity or risk value to each node (institutional sex-

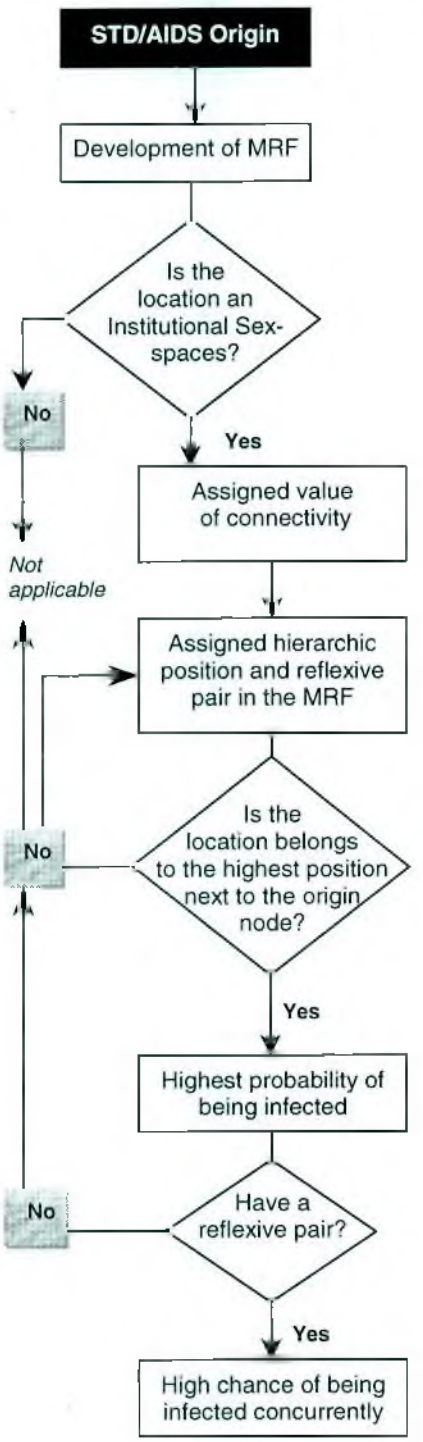


Figure 5.7 *Flow chart shows the main elements of simulation of spatial diffusion of STD/AIDS through trucker community*

space) of the field; and determining their hierarchic positions. However, with these elements, a logical sequence of conclusion *i.e.* an algorithm was made for the simulation of spatial diffusion of STD/AIDS (Figure 5.7). Therefore, with this manner one can evaluate the STD/AIDS potentiality of each institutional sex-space in the country.

While, in the Table 5.9 the proposed MRF, one of the major elements of simulation chart, is shown. The MRF is a track consisting of 14 x 14 cells. Each cell represents an institutional sex-space, and the total 14 cells of the MRF represent the country's total. Eventually the MRF represents the risk field of the country as a whole. The value of each cell derived from the degree of connectivity indices of all institutional sex-spaces during last three months from the time of

interviewing (*vid.* Table 5.7). The cell value is assigned to determine the probability of being infected with STD/AIDS. Figure 5.9 shows the core-cell as black, which implies that the very cell has already been infected. The probability of risk is greatest (p=1.3 or 130%) at the girdled cells of the center and lowest at the corner most cells, the bottommost of the hierarchic order, where probability is less than 20 *per cent* (p= 0.20).

Now, let turns to look upon the use of the proposed scheme of MRF especially to determine spatial diffusion path of AIDS. As mentioned elsewhere in the thesis about the possible gates of AIDS for Bangladesh *viz.* Bhomra, Benapole, Hili Sonamasjid, Banglabanda, Burimari, Haluaghat, Tamabil, Akhaura, Mongla, Chittagong port, Teknaf *etc.* The basic principle of the algorithm indicates that whersoever the AIDS virus enters into Bangladesh; it will follow the path of probability of risk in each cell of the MRF. Thus for showing the path of spatial diffusion, MRF grid will be placed over each origin cell in turn, so that the origin cell is located in the center cell of the MRF. For example, if AIDS originated in Hili, the floating MRF grid will be centered over Hili. Now, according to the way mentioned in the MRF, AIDS virus will first jumps over Rajbari, since the location possess highest probability (p=1.3) Antithetically, the chance of reaching of AIDS virus in Jhalakathi is lowest with nearly just 20 *per cent* only *(*Table 5.9).

Besides, the path of the diffusion way can also be determined by reflexive pairs of the areal algorithm (*vid.* the analysis of areal algorithm). The shaded cells of the MRF are representing the reflexive pairs implying that if a member of a pair becomes infected, the other member of the pair, even though with different probability value, has equal chance to be infected at the same time. Thus though the risk value of Rajbari (1.27) and Saidpur (1.13) is not equal, but they are reflexive pair to each other, both the locations have equal chance to be infected simultaneously.

Table 5.9 **Mean Risk Field** (MRF)

O	1.3	1.1	0.93	0.83	0.79	0.69	0.67	0.57	0.55	0.50	0.34	0.33	0.19
1.3	1.3												
1.1		1.1											
0.93			0.93										
0.83				0.83									
0.79					0.79								
0.69						0.69							
0.67							0.67						
0.57								0.57					
0.55									0.55				
0.50										0.50			
34.3											0.34		
0.34												0.33	
0.19													0.19

Legend

1st. Order Reflexive Pair (Rajbari ⇔ Saidpur)
2nd. Order Reflexive Pair (Khulna ⇔ Mongla
3rd. Order Reflexive Pair (Mymensingh ⇔ Tangail)

Note 1: *The 'Mean Risk Field (MRF), which originally derived from concept of Mean Information Field (MIF) of Hägerstrand model of spatial diffusion, and was developed for the present thesis on the basis of the degree of connectivity or contactability (χ^2), which shows proportional decrease of value in the lowering tiers of the hierarchy. The center of the MRF is representing the origin (O) i.e. origin node of ST/AIDS. Though STD/AIDS is transmittable, but its spreading behavior is not as random as that of the ordinary contagious diseases. Rather it moves on mainly through sexual networks. This is why hierarchic ordering of vulnerable locations is important in determining the paths of STD/AIDS diffusion in certain field or track. Keeping this in mind cell values are arranged according to their hierarchic position.*

Note 2: *The potential STD/AIDS field in Bangladesh is considered in terms of the total sex-spaces, and as there are 14 institutional sex-spaces in the country, then the MRF is designed with 14x14 cells.*

Note 3: *The shaded cells are representing the reflexive pairs (vid. the analysis of areal algorithm implying that if a member of a pair becomes infected, the other member of the pair, even though with different probability value, has equal chance to be infected at the same time.*

5.4.2 Spatio-temporal dynamics

This spatial probability may also be seen from the view of spatio-temoral dynamics. To do this a spatio-temporal contact probability field was developed. This field was designed with four elements *viz.* probability contact; deviation from "highest index cycle of probability of being infected with STD/AIDS" *i.e.* p =1; and the times needed to be p =1 *etc.* (Table 5.10). A detail of explanation of each element is also provided along with the Table 5.10.

Probability of contact of each cell or node has been derived from the degree of connectivity indices (*cf.* Table 5.7). The degree of connectivity is developed from the data of sexual contactability of each node during the last three months at the time of interviewing. As it is proved that sexual networking is one of the major risk factor of spreading STD and AIDS (*vid.* assumption 1, Chapter 2), and then sexual networking can also be used to show the risk probability of STDs. Thus MRF as well as the probability of contact in the spatio-temporal contact probability field was developed from the data of spatial pattern truckers' sexual networking. Sexual Networking, in other words, generally indicates the probability of being contact of each node. Therefore, random numbering as used in the original Hägerstrand's diffusion model was not needed to draw the theoretical probability of infection *i.e.* probability distribution of risk of each node. Rather empirical findings of sexual networking can also be used to show the risk probability of each node. Similarly, imploded location between nodes was considered instead of their actual distance.

The third column of the Table concerns with the deviation from *P=1*, which implies deviation from highest index cycle of probability of a node to be infected that valued with the sum of 1. Thus deviation = {1- (current probability of contact)}. For example, in the case of Bagerhat, probability of contact = 0.34, therefore, deviation = (1- 0.34) = 0.66. Note that idea of highest index cycle of probability (p=1) was

derived from the general notion of arithmetic indexing. Since the present model was based on three months data*, therefore, 3 months' value becomes the base of the whole index *i.e.* base-value becomes value-1. Mathematically, value-1 is the highest value to complete an index cycle. A value of less than 1 (<1, *e.g.* 0.99) implies incomplete index and value more than 1 (>1, *e.g.* 1.10) implies index cycle complete once more. This mathematical notion has been utilized to explain whether a cell completes its index value *i.e.* maximum probability of being infected. This was also grabbed from the assumptions that "index value = 1" is identical to the sense of "probability =100 *per cent*". The idea of "100 *Per cent*" usually implies that critical limit in which something becomes saturated and turns into consequent change. Keeping with view, it was ascertained that the state probability =100 of node will be turned into the state of infected with STD/AIDS. Thus if the index value of a cell becomes the value of 1, the cell will be infected immediately and since as mentioned earlier that the base value was determined from three months' period, then the base time of being infected is also three months.

The fourth column of the Table 5.10 shows the times needed to complete index cycle 1 or p=1 for different cells or nodes *i.e.* different institutional sex-spaces in the country. The Table thus can be used to forecast the probability spatial-temporal dynamic pattern of diffusion of STD/AIDS in Bangladesh. It indicates that if AIDS enters into Bangladesh, and if the truckers become vector, it will certainly be carried to Rajbari first and within a period of 2.55 months and transported to others sex-spaces within the times needed according to their risk probability as mentioned in the Table 5.10.

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* *An important logic of taking three months' data is for the reliability. It is indeed difficult to recall long memories. The more elapsed memory the more distortion. Thus the respondents were asked to recall only the past three months' sexual experiences.*

Table: 5.10 **Spatio-temporal Contact Probability Field**

Location	probability of Contact	Deviation	Time needed to complete *P*=1.00
Bagerhat	0.33	- 0.67	3 + 6.09 = 9.09 months
Faridpur	0.54	- 0.46	3 + 2.55 = 5.55 months
Jamalpur	0.57	- 0.43	3 + 2.26 = 5.26 months
Jhalakathi	0.19	- 0.81	3 + 12.79 = 15.79 months
Jessore	0.67	- 0.23	3 + 1.02 = 4.02 month
Khulna	0.92	- 0.08	3 + 0.26 = 3.26 months
Magura	0.49	- 0.51	3 + 3.12 = 6.12 months
Mongla	0.92	- 0.08	3 + 0.26 = 3.26 months
Mymensingh	0.78	- 0.22	3 + 0.84 = 3.84 months
Narayangonj	0.82	- 0.18	3 + 0.65 = 3.65 months
Patuakhali	0.34	- 0.66	3 + 5.82 = 8.82 months
Rajbari	1.27	+ 0.27	3 - 0.63 = 2.37 months
Saidpur	1.13	+ 0.13	3 - 0.34 =2.66 months
Tangail	0.68	- 0.32	3 + 1.41 = 4.41 months

Note That:

Probability of Contact: *Originally, probability of contact in a diffusion model is a function of both the distance between the source and destination cells and the number of people in each cell, then the contact probability may be weighted as follows (after P. Haggett, Geography: A Modern Synthesis, 2nd edition 1975. p.305):*

$$C_i'' = \frac{C_i' N_i}{\sum_{i=1}^{25} C_i' N_i}$$

Where,

C_i' *= the joint probability of contact with the i-th cell based on the MIF and population,*

C_i *= the original probability of contact with the i-th cell based on the 25-cell MIF,*

N_i *= the number of people in the i-th cell, and*

$\sum_{i=1}^{25}$ *= summation of all* $C_i' N_i$ *values for the 25 cells within the MIF, including the i-th cell*

But as mentioned earlier, some modifications have been adopted in the present scheme such as imploded location is considered instead of geographic distance and the probability of being infection has been calculated from the numbers of sexual links between each nodes, thus weighting contact probability of each cell or node can be rewrite as:

$$\chi = \frac{L_i}{\{X_{i(1-n)}\} - 1} \qquad \text{then,} \quad \chi^2 = \frac{\Sigma L_i}{\Sigma x} \qquad \text{(cf. Table 5.7)}$$

Deviation $= 1 - \chi^2$*, e.g. for Bagerhat,* $\chi^2 = 0.34$*, therefore, deviation = (1- 0.34) = 0.66*

Time needed to complete p =1.00: *meaning that contact probability (p) of each cell is assigned for three months' period, which may be more or less than 1. Therefore, how much time is needed to be p =1. For example, for Bagerhat, the three months' contact probability is 0.34, and deviation is 0.66, for which a period of 5.82 months more time is needed, thus a total of (3+ 5.82) = 8.82 months is needed to completed p=1. In short, needed time can be calculated with the flowing formula:*

$$\textit{Time for (p=1)} = \left[\frac{\textit{3 months x Deviation}}{\textit{Probability of Contact}}\right] + \textit{3 months}$$

5.4.3 Prediction of Infectability of Different Institutional Sex-spaces

Though the earlier section shows how soon different institutional sex-spaces may have been reached the fullest cycle of vulnerability *i.e.* at what time a location may be becoming p=1, but it does not means that the location actually becomes infected. It is quite evident that a person with the highest vulnerability may not be infected. This is also true for particular location. Thus the question of infectability arises. The term may be defined as the probability of the rate of infection among the vulnerable numbers. Then the incidence rate can be used to determine the infectability of particular location in context to their degree of vulnerability. This measure is important to assess the potential production rate (of STD/AIDS) of different sex-spaces in Bangladesh. Consequently, it would be easier to predict the future AIDS production rate as well as current STD production from different sex-spaces in Bangladesh. Even it could use to assess the total volume of STD cases are being originated in Bangladesh as well as AIDS likely to be produced in future.

To put the concept into use, incidences rate that reliable as well as applicable to Bangladesh situation was searched. First, the sources from world Health Organization suggested a big probability range from 1 per 1000 to 4 per 100 for sexual exposure, even they further suggested more higher rate was reported in Thailand (WHO, 1987, 1990,1991a). This source is no doubt reliable, but not specific. The incidence rate as shown in the present thesis is not for HIV case, hence applicable. Fortunately, in a report, Institute of Epidemiology, Disease Control and Research (IECDR) has predicted a specific rate for high-risk groups in Bangladesh. It shows 0.5 per thousand (0.05‰) or 0.05 for per hundred (0.05%). Since the truckers fall into the high-risk groups and since this rate is specific, thence the rate has been taken as a standard value for estimating the infectability of different institutional sex-spaces.

The process of the computation and the outcome has been illustrated in the Table 5.11. It should be assumed that the rate of outcome of HIV positive depends on the probability of contact of particular location. This attribute can easily be borrowed from the degree of sexual networks of each institutional sex-spaces. The degree of sexual networks or contactability has originally been produced in index form, but the rate of incidence of was given in the IEDCR reports in the form of percentage data. Then the index value of the probability of contact in the Table 5.11 has also been converted into percentage form. While the index of contactability of different institutional sex-spaces, which was developed from the three months' data, was also needed to convert into yearly average. This conversion was made with the formula given along with the Table 5.11. After completion of all these jobs, with an another formula the infectability of different institutional sex-spaces was made, which is shown in the Table 5.11.

It is seen in the Table 5.11 that Rajbari and the Saidpur have the highest infectability with 8.06 *per cent* and 6.38 *per cent* of each. This figure also reveals that Rajbari has the potential to produce nearly 15-times more HIV positive cases than of Bagerhat and about 45-times than of Jhalakathi. However, scenario of infectability of different institutional sex-spaces is analogous to that of the relative picture of contactability of institutional sex-spaces (Table 5.11). Nevertheless, this analysis may help in diagnosis of locational vulnerability with more precise picture and also with the output of the vulnerability of specific location. Note that a recent study have found 2 HIV positive cases at Daulatdia brothels in Rajbari (NAC, 1991). The present study shows same findings for Rajbari in mapping the STD-cores in Bangladesh. The forthcoming sections are then designed to have empirical evidences of the proposed schema by searching the actual spatial pattern of STD among the truckers in Bangladesh.

Table: 5.11 **Infectability of Different Institutional Sex-spaces**

Location	probability of Contact (χ)		HIV Infectability	
	Index Value	%	Index	%
Bagerhat	0.33	33	0.0054	0.54
Faridpur	0.54	54	0.0146	1.46
Jamalpur	0.57	57	0.0162	1.62
Jhalakathi	0.19	19	0.0018	0.18
Jessore	0.67	67	0.0224	2.24
Khulna	0.92	92	0.0423	4.24
Magura	0.49	49	0.0120	1.20
Mongla	0.92	92	0.0423	4.23
Mymensingh	0.78	78	0.0304	3.04
Narayangonj	0.82	82	0.0336	3.36
Patuakhali	0.34	34	0.0058	0.58
Rajbari	1.27	127	0.0806	8.06
Saidpur	1.13	113	0.0638	6.38
Tangail	0.68	68	0.0231	2.31

Notes that:

- *It should be assumed that the rate of outcome of HIV positive depends on the probability of contact of particular location. This attribute can easily be borrowed from the degree of sexual networks of each institutional sex-spaces. The degree of sexual networks or contactability has originally been produced in index form, but the rate of incidence of was given in the IEDCR in the form of percentage data.*
- *Then the index value of the probability of contact has also been converted into percentage form. While the index of contactability of different institutional sex-spaces, which was developed from the three months' data, also needed to convert into yearly average. This conversion can be made possible with the following formula:*

$$\sqrt{(\chi)^4} \quad \text{..... (I)}$$

$$\sqrt{\frac{(\chi)^4}{100}} \times 0.05 \quad \text{..... (II)}$$

Where, χ = Probability of contact in percentage form;

- *This value then squared twice, and then rooted over to get the average yearly value of contactability. Finally, the root value multiplied by the value of incidence rate given by the IECDR as base value for infectability. Thus the whole process can be mathematically write as shown in the Formula-II.*

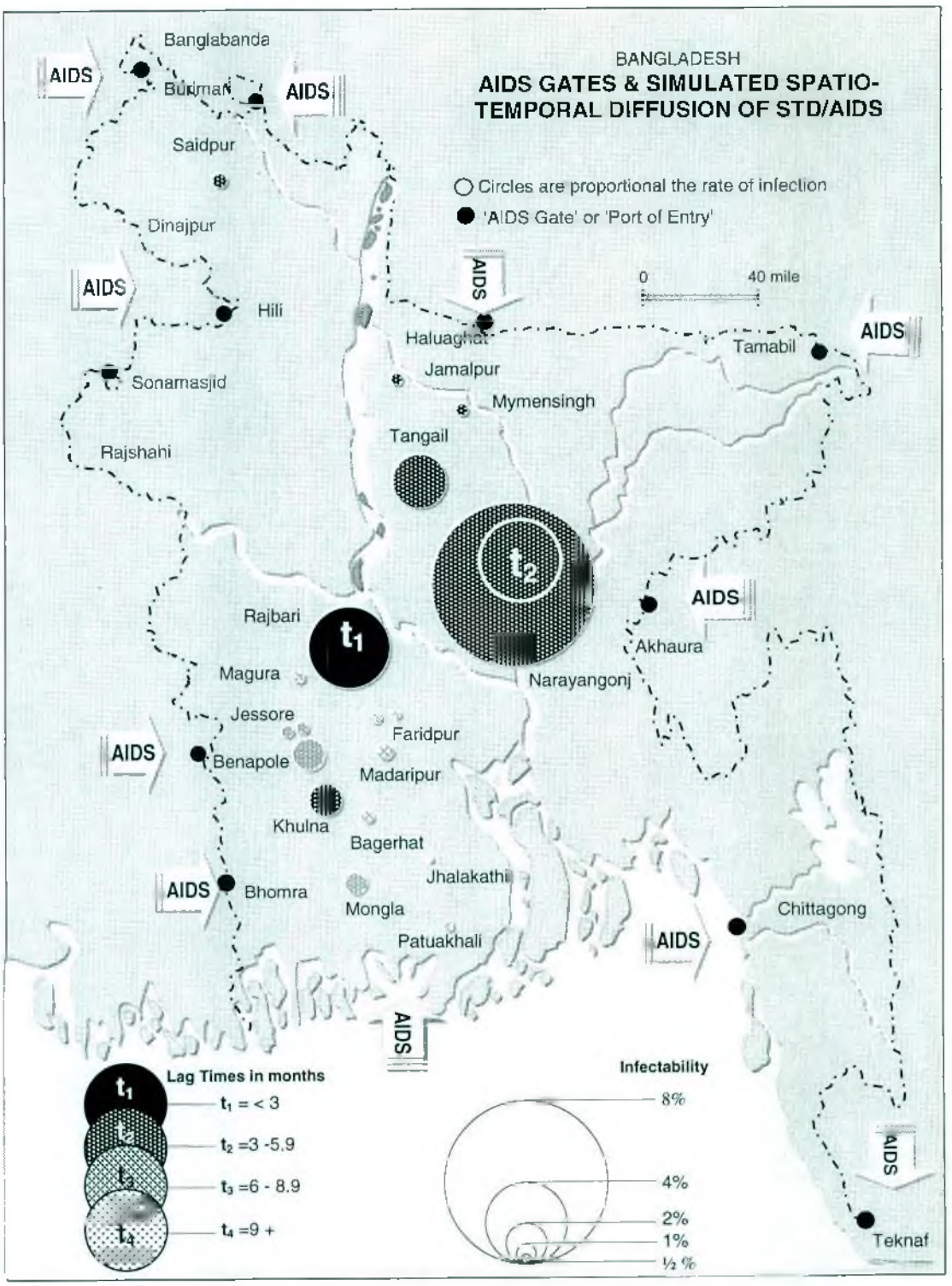


***Figure 5.8**. 'AIDS Gate' or may termed as the 'Port of Entry' for Bangladesh and simulated lag map of spread behavior of STD/AIDS. The map shows different lag times in months based on spatio-temporal contact probability field. The lags are categorized into four episodes or time generations such as fewer than three months (t_1 = < 3), three to near six months (t_2 =3 -5.9), six to near nine months (t_3 =6 - 8.9), nine or more months (t_4 =9 +). Circles are proportional to the rate of predicted infections of respective stations.*

5.5 Spatial Aspects of STDs: Empirical Evidences

5.5.1 Prevalence, Incidence and Pattern

An illustration on STD situation of the globe as well as of Bangladesh has been analyzed and given in the review section of the thesis (*vid.* Chapter 2). It is shown there that sexually transmitted diseases (STD) is a major public health concern in most developing countries like Bangladesh and now compounded by the advent of AIDS. The actual size of the problem represented by STD/ HIV is unknown. The Institute of Epidemiology, Disease Control and Research, Bangladesh (IEDCR) reported that the prevalence of HIV/AIDS among high-risk groups in Bangladesh is 0.5 per thousand (0.5 ‰ or 0.05%), meaning that one every 2,000 high-risk persons has already been infected (IECDR, 1993). The number of HIV positive has been increasing steadily since 1990. While in 1995 the detected HIV positive cases in Bangladesh was only 44 that raises up to 105 in 1998 and the cumulative number of AIDS cases now stands at 10, of them 8 passes away (Discussion with Professor Nazrul Islam, BSMMU, 1998)[13]. A projection of WHO shows that AIDS cases in Bangladesh will cross the number of 147,000-703,000 by the turn of this century (WHO, 1995).

After advent of AIDS a good number of studies were done on different communities in both urban and rural settings in Bangladesh to determine the prevalence and other epidemiological aspects of different STDs. But no systematic and nation-wide reporting system or national survey and surveillance system for STD yet to be developed here in Bangladesh. Moreover, many people with an STD never seek health care and conceal their diseases, even some people, especially women, remain asymptomatic or show few symptoms (WHO, 1991: p.89). Hence it is very difficult to assess the STD situation in Bangladesh. However, some studies shows different pictures for different community, such as Roddy with others (1989) showed 29 *per cent*

of STD prevalence among Bangladeshi pregnant women. Wasserheit *et al.* (1989) have seen 68 *per cent* of the rural women showing evidence of RTI/STD. Similarly, another study revealed that 54 *per cent* had a history of suggestive of present or past RTI/STDs (Bhatta, 1993). These figures are absolutely alarming. The scenario of urban Bangladesh is even worse. Moreover, some statistics indicate the rapid increase of STD cases in the country. A consecutive monthly report from Khulna Hospital shows the increasing STD records as follows: 1185 STD cases recorded in June, 1991, 1391 in July, 1991, 1493 in August, 1991 and 1543 cases recorded in September, 1993. The reports from different medical collages, family planning and MR clinics of Dhaka City clearly indicate the thriving figure of STDs in the city (Mian and Karim, 1993).

The general picture of STD/AIDS situation in Bangladesh is rarely known, let along the specific picture of truckers. Since none of studies exclusively have done on trucker community to determine their STD status. A few studies, however, show split figure on truckers in Bangladesh. A national survey had found two cases of HIV positive among the truckers (NAC, 1991). While a studies on blood testing laboratories in Dhaka City showed that truckers were the second most clients next to the CSWs (Bhuiya, 1995). This data indirectly indicates the truckers' position in other high-risk groups. Finally, as the present study was conducted with the facility of selected STD clinic for trucker, then the STD records in these centres were also used. Note that of the centres, only Paricharja at Tejgaon belongs the blood testing facilities, and other three centres at Aricha, Benapole, and Hili of CEDAR follows the SMx (Syndromic Management instead of lab. based diagnosis). Though these centres are developed exclusive for truckers, but general people are also restrictedly allowed for treatment. The records show that a total of 4,284 truckers visited the CEDAR centre at Aricha in the year of 1997, of which 418 were treated for STD problems and gonorrhoea and syphilis were recorded as commonest STDs. As a whole the report predicted 43 *per cent* of the truckers had

history of different STDs (CEDAR Annul Report, 1997; The Daily Independent, 6 August, 1997).[14] The records of the clinic at Tejgaon namely Paracharja shows that of the total attending patients in 1997 (all cases, N = 462) 50 *per cent* are truckers, and of the STD patients (N = 128) 61 were trucker (48%). The records further shows that among the truckers STD patients 55 *per cent* were married and 91 *per cent* were of the age group of >15 years. The STD pattern of truckers as recorded in the year of 1997 at the centre showed in the Table 5.12.

Table 5.12 **Pattern of STDs among Truckers as Recorded at Tejgoan**

Pattern of STD at Tejgaon	**% (N = 128)**
Scrotal Swelling	07
Genital Ulcer	20
Urethal Discharge	73

Source: *Patient Roster, Paracharja, 1997*

However, other than these sources, data as to the pattern, prevalence and incidence of STD among the truckers were also investigated through questionnaire and interviewing in the present study. It has already noted that the respondents were well familiar with the very much known STDs such as syphilis and gonorrhea. Even they were found well informed about the potential transmission routes of these diseases and they did little care about whether the heterosexuality causes STD or sex workers are passing diseases to them (*vid.* Chapter 4). Then, the question was raised as to whether the respondents had ever experienced with any one of STDs during their lifetime as well as in the last three months. The responses were shown in the Table 5.13(a). The table revealed that of the total samples only 13 cases (5.42%) were reported to have STD sometimes during the last three months before the interviewing and all were found at Aricha. But none was found to be suffered once

more during this period (Table 5.13a). Thus the prevalence of STD among the trucker can be estimated as the figure of 5.42. Similarly, incidence of STD among the truckers can also be estimated. As estimated earlier that 69.58 *per cent* (N= 167) of the samples are shown to have multiple sex partners during the last three months (*vid.* Chapter 4), then can be recognized this portion at risk among the trucker community. The incidence rate is 7.78 *per cent* (figure derived from the figure of infected persons = 13, which is multiplied by the figure of population at risk = 167). The number of STD cases was indeed not probabilistic random, then the estimated rate of STD prevalence and incidence based on that figure, however, may not be representative. Notice that STD interventions in Bangladesh is a new phenomenon and the selected centers were established just a few years ago and yet not duly recognized by the truckers; consequently the visitors are limited. Therefore, the visitors of these centers are by no means representing the actual rate of infected persons among the truckers.

The respondents were then asked about their lifetime story of the occurrence of STD. It is needed to note here that the tormenting experience of STD patients induces them to conjures up and thus the question was not too impervious to the respondents to answer. The Table 5.13(b) makes the fact that nearly half of the sample respondents (45.42%) were experienced with STD incidence at least once in their lifetime. Even a good number of respondents were found to have 2-3 times experienced and a very few were surprising more than 4 times, but none had 5 + experiences. Thus an overall representative picture of STD prevalence can be derived from these figures. The table shows the rate of lifetime prevalence among the respondents is 63 *per cent*, (subtraction from the figure 'never experienced with STD' = 37.08%) meaning that this percentage of trucker population has the occurrence of STD at least on their lifetime. Moreover, despite the pain-racked

experience of STD sufferings, a good number of sample truckers fell again and again into STD miseries. It was the respondent who discloses the researcher that single experience of STD incident makes them alert, because of it's painful sufferings, hence the percentage of one-time suffers is higher. But then the question as to why a good number of samples over and over trapped by STD instead of its titanic suffering is still striking. The respective respondents avoid the question due to timidity or sometimes blaming their 'bad behavior'. However, one thing was clear from their attitude that the widespread unconsciousness regarding safer sex, lack in timely and appropriate treatment of STD are characteristic features among trucker community (*vid.* Chapter 4). This pictures doubtlessly traumatic and suggests emergency need for undertaking interventions.

Table 5.13 (a). **Suffering from STDs during Last Tree Months**

Suffering from STD	*f* **(N=240)**	%
No case	227	94.58
1	13	05.42
1+	00	00.00
Prevalence rate = 5.42 Incidence rate = 7.78		

***Source:** Questionnaire Survey, 1997*

Table 5.13 (b). **Lifetime Suffering of STDs among the Respondents**

Suffering from STD	*f* **(N=240)**	%
Never	89	37.08
1	109	45.42
2-3	39	16.25
4-5	3	1.25
5 +	00	0.0
Total lifetime STD incidence among the respondents = (109+78+12) 199		
Lifetime Prevalence of STD among the respondents = (100-37) 63%		

***Source:** Questionnaire Survey, 1997*

5.5.2 Geography of 'STD-cores'

In the previous section, potential ways of spatial diffusion of STD is shown and the probable process of the spread of STD, even AIDS is elucidated. By searching and analyzing the spatiometric risk networks of truckers community, a series of vectors or network graphs can be drawn to predict the probability of future direction of STD epidemics. But the origin is still a puzzle. Just how STD arrives at some location is very important to known. The question is well fitted to the concept of STD-core that refers to that group of people frequently infected with STD and often transmitted the infection. The term has also been used including the present research to refer to geographic areas with large numbers of cases. This concept is useful in identifying strategic points of intervention to reduce STDs (*vid.* Chapter 2). But operationalizing this concept for the need of the present research is difficult for at least two reasons: **first**, since no regular surveillance data or nationwide reporting system for STD incidences is available in Bangladesh; and **second**, due to migration, the place of exposure may have been different from where the person is living at the time of diagnosis or of death. This is particularly true for the case of highly mobile trucker community. Hence the epidemiological notion of STD-core *i.e.* geographic areas with large number of STD patients can not logically be fitted with the fact that the area is the origin of STD. But usual medical records are not considering this critical point in their procession.

In the present research, therefore, the respondents were directly questioned to recall the places from where they acquired STD. It may be argued that an STD infected person, if he is infected through sexual contact, should able to identify the location most likely to be the origin of STD. It is also apparent in the respondents' ripostes. It may further note here that the hypercritical sufferings of STD ailment are too harsh to forget. Moreover, most of the respondents (45.42%) had suffered only

once in their lifetime (Table 5.13b). Hence it was not surprising to have the expected responses from the respondents. Then it was possible to turnout the following tables, which expose the STD origins as reckoned by the respondents from their retrospective experiences of the whole life. Even some of the respondents were able to identify places they certainly know responsible for STD origin. This certain but indirect empirical knowledge they earned from infected peers.

Table 5.14(a) summarized the spatial identity of STD-cores as perceived and experienced by truckers in Bangladesh. The table indicates that all the STD experienced respondents were able to identify the potential origin of their respective incidence of STD. Thus a total of 199 (total lifetime occurrence of STD among the sufferer respondents =(109+78+12) 199: *cf.* Table 5.13b) were plotted according to the nature of the sex-spaces. This plotting as seen in the Table 5.14(a) make the fact that though independently institutional sex-spaces are perceived by the respondents to be the most suspected origin of STD (48.24%), but the different hidden sex-spaces jointly generate rather more STDs (22.61+ 29.15 = 51.76%) among the truckers (Table 5.14a). It is also apparent in the same table that hotel-girls are less prone to STD (22.61%) than the absolute floating CSWs *i.e.* street gay girls (29.15%). Similar findings were seen in another study. Kabir *et al.* (1989) carried out a comprehensive study on the institutionalised prostitute of Tanbazaar and floating gay girls of Dhaka City and had found that the prevalence of syphilis was 39 *per cent* among the institutional sex workers and 56.4 *per cent* among the floating girls respectively (Kabir *et al*, 1989). To the respondents, hotel-based sex-workers are comparatively clean and disease free. In fact, high-rated girls either from brothels or floating girls are employed in hotel-based sex business. Even it was said that sex-workers' hygienic status visibly depends on the rank of hotels. Since, as mentioned earlier, truckers mostly preferred to visit medium class hotels and brothels, then these two sources were common for

the case of trucker in acquiring of STD. Finally, none of the respondents reported to have STD from sources like fiancées or other household sources. This reveals that epidemic of STD not yet penetrates into the daily-life of Bangladesh.

Table 5.14b specifies the location and route of different STD-cores in respect to both of respondents' own experiences or of they know certainly. It shows that a total of 96 incidences of STD originated in different institutional sex-spaces in the country. Of these sex-spaces, as indicated by the respondents, Narayanganj and Rajbari put on the top of the list. Note that the biggest brothels in Bangladesh are seen in these two locations. Besides, Rajbari is characterized with the highest degree of sexual networks. Similar factor is true for the case of Jessore and Faridpur in which three brothels are existing. These two locations are also shown as important STD-core. While Mymensingh and Jamalpur are also identified as important STD-core in spite of their low degree of sexual networks. Khulna, for example, despite the high degree of network shows less position in the list of STD-core. Similarly, Tangail though with big size and high networks shows low position. While some location are in the periphery of STD domain absolutely due to their outlying location in the sexual networks, such as Patuakhali and Jhalakathi, for example.

Besides, STD-core status of hidden sex-spaces was also investigated. But as mentioned earlier that these spaces are recorded on the basis of the location of major truck routes. Table 5.14 (b) shows the frequency and percentage distribution of hidden STD-cores. This includes hotel-based (45 cases) and street floating CSWs (58 cases). Thus a total of 103 incidences of STDs were seen to be originated in different hidden sex-spaces on different routes. Besides, plenty of indirect experiences (212 cases) regarding hidden STD-cores were also recorded. However, Dhaka-Chittagong route is identified from both the respondents' own experiences

(36.89%) and indirect experience (36.32) as the route most prone to STDs (Table 5.14 b). Similarly, other routes are also shown as STD-cores in different scale.

One thing is needed to note here that the total of direct experience is taken from the STD sufferer samples, while the indirect experiences were freely taken from all respondents, if they had any of such experience. Thus the total of indirect experiences (N = 270+ 212 = 482) regarding both institutional sex-spaces (N = 270) and hidden sex-spaces (N =1212) was more than double than of direct experiences (N of institutional sex-spaces, 96+ N of hidden sex-spaces = 103, then the total = 199). Moreover, the value of these two forms of data logically should not be same. Hence, considering this logical and mathematical ground some weight was assigned to both of two forms of data, such as assigning weight 1 for the data of direct experience and weight 0.5 to the data of indirect experience. Then it was possible to develop a new table with the weighted values of these two forms of data, which shown in the Table 5.14(c).

Table 5.14(c) shows the different truckers STD-cores in the country and their respective ranks, which derived from the logically induced weights. The systematic valuation of respondents' experiences shows that Narayanganj scores the high weigh (42.0 including 12.0 for direct experiences and 30.0 for indirect experiences). Note that Narayanganj secures rather high weighs from indirect experiences. This place is characterised by the ever-biggest brothel in the country, but the location is not in the core of the truckers' sexual networks. Thus clearly indicates that there might have a relation between the size of the brothel and the rank of the STD-core. Rajbari, obtains the second highest weights for STD-core. This location is characterised with the country's second largest brothel as well as the core of the truckers' sexual networks. Then, it reveals that sexual network is an another important factor for being a location STD-core. Both the sexual networking and the size of the brothel independently or jointly playing role in making a location STD-core. Thus the combination of these two

factors in a particular location positively turns it towards vulnerable to STD-core. However, the next important weights of STD-core were seen for Jessore and Faridpur securing weights of 28.5 and 27.0 respectively. These two locations are characterised with three sizeable brothels. Surprisingly, Mymensingh (weight =17.5) scores rather higher than its position in sexual network. Even this location does not have large enough sex worker, but as perceived by the respondents, sex-workers are rather cheaper and maintain less quality. Similarly, Jamalpur in spite of less degree of sexual networks as well as of fewer sex workers, scores rather higher weights as STD-core. Most seemingly remoteness of this location characterised by low quality of brothel and lack of available treatment facility for the CSWs are playing underlying role along with others. Surprisingly, Khulna and Tangail though have larger number of sex workers and higher sexual networks, but assigned fewer weights as STD-cores. The metropolitan facilities, interventions may help to reduce incidences in these places. Note that Care, Bangladesh, an NGO, has been successfully implementing a demonstration project on the prevention of STD/AIDS in Tangail brothel. Similar interventions are also found in Khulna. While the rest STD-cores are seen apparently being weighted as per their respective position in the sexual networks.

However, the precise underlying factors of being a location STD-core were not studied, except some notes were gathered from the respondents' reasoning. To the respondents, remoteness, size and quality of institutional sex-spaces and other hidden sex-spaces, having lack of treatment facility and other interventions, poverty of sex-workers *etc.* may be the noticeable factors in making a location STD-core. Nevertheless, sexual networking is bedrock of all. The next section, therefore, precisely analyzed the STD-cores in relation to the degree of sexual networking of different sex-spaces.

Table 5.14 (a). **Distribution of STD-cores by the Nature of Sex-spaces**

Sex-spaces	*f* **(N=199)**[1]	%
Formal / Institutional sex-spaces (N=96)	96	48.24
Non-formal / Hidden Sex-spaces (N= 45+58 = 103)		
▪ Hotel-based sex-space	45	22.61
▪ Other anonymous or hidden sex-spaces *e.g.* street girls	58	29.15

Source: *Questionnaire Survey, 1997*

Note 1: *total lifetime STD incidents among the respondents, N=199*

Table 5.14 (b). **Spatial Distribution of 'STD Cores'**

Origin Places	**locations / routes**	*f* **& %**	
Respondents' own experiences[1]			
Institutional Sex-spaces	**Location**	**(N=96)** [1]	**%**
	Bagerhat	2	2.08
	Faridpur	16	16.67
	Jamalpur	3	3.12
	Jessore	13	13.54
	Jhalakathi	0	0.0
	Khulna	6	6.25
	Magura	1	1.05
	Mongla	7	7.29
	Mymensingh	6	6.26
	Narayanganj	12	12.5
	Patuakhali	3	3.13
	Rajbari	21	21.85
	Saidpur	4	4.18
	Tangail	2	2.08
Other anonymous places in major routes[2]	**Routes**	**(N = 103)** [2]	**%**
	Dhaka-Chittagong	38	36.89
	Dhaka-South	20	19.42
	Dhaka-North (Rajshahi)	18	17.47
	Dhaka-North (Dinajpur)	15	14.57
	Dhaka-Sylhet	09	8.73
	Dhaka-Mymensingh	03	2.92

Table Continued. . .

Continuation of Table 5.14 (b)

Respondents certainly Know [3]			
Institutional Sex-spaces	**Location**	***f* (N=270)**	**%**
	Bagerhat	6	2.22
	Faridpur	22	8.15
	Jamalpur	15	5.55
	Jessore	31	11.48
	Jhalakathi	0	0.0
	Khulna	8	2.96
	Magura	11	4.07
	Mongla	18	6.67
	Mymensingh	23	8.52
	Narayanganj	60	22.22
	Patuakhali	5	1.85
	Rajbari	41	15.19
	Saidpur	25	9.26
	Tangail	5	1.86
Other anonymous places in major routes	**Routes**	***f* (N=212)**	**%**
	Dhaka-Chittagong	77	36.32
	Dhaka-South	34	16.04
	Dhaka-North (Rajshahi)	43	20.28
	Dhaka-North (Dinajpur)	17	8.02
	Dhaka-Sylhet	30	14.15
	Dhaka-Mymensingh	11	5.19

Sources: *Questionnaire Survey, 1997*

Note 1: *This data collected from the respondents' own experiences of suffering STD, meaning that respondents identified the STD-origins from his own experience and since the total 96 responses were showed for different brothel as the origin-node of their STDs, then the N=96.*

Note 2: *The responses were also taken for identifying the anonymous places on different truck routes that suspected to be origin of STD. These places are hotels/boarding, floating sex workers concentrations, relatives or fiancées etc. Exact location of these places was not collected. However, a total 103 STD cases were identified originated in different hidden sex-spaces, then N = 103.*

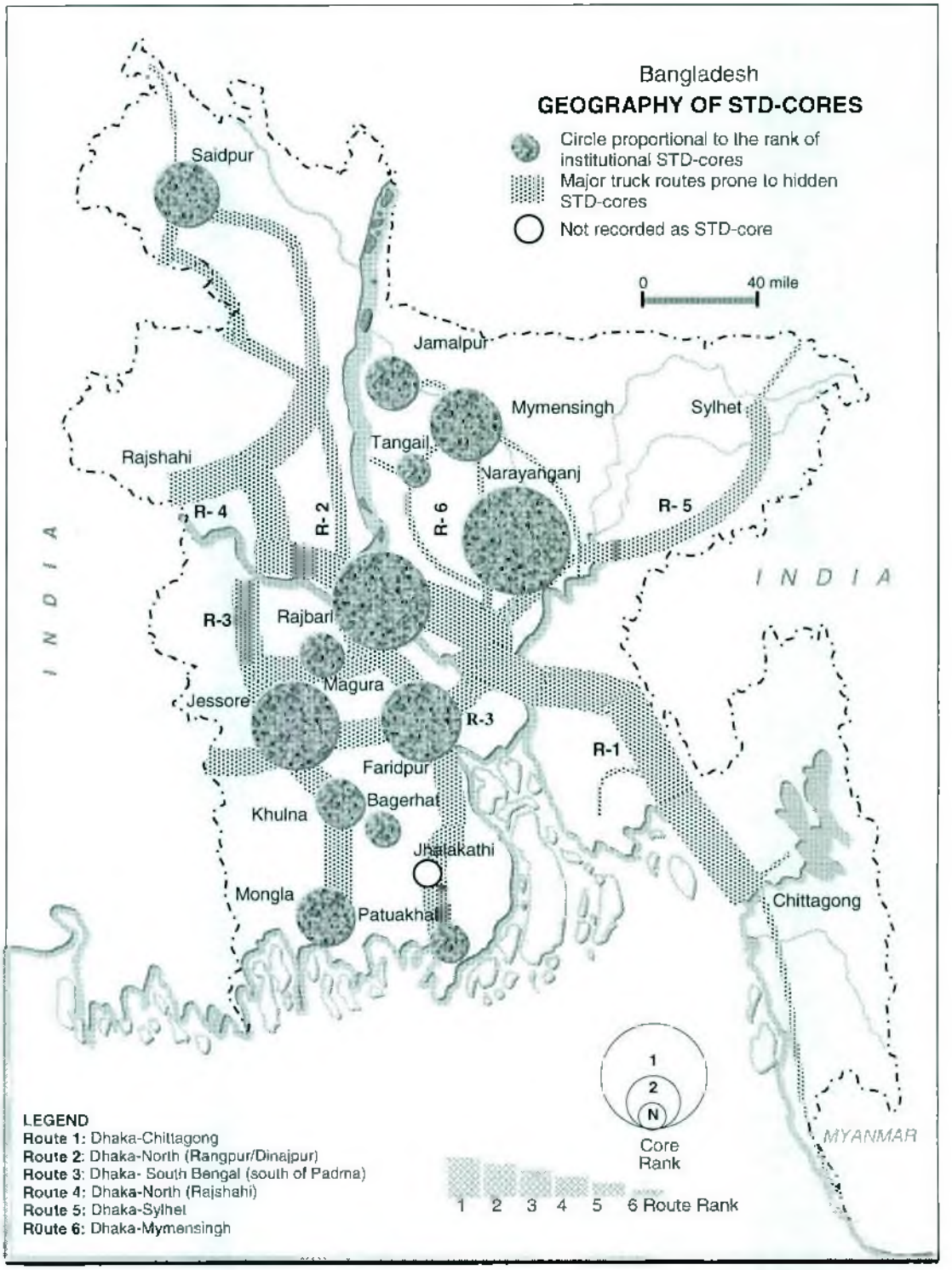
Note 3: *Other than the respondents' own experiences, responses regarding the STD origin that respondents certainly know true from their closer friends' incident. These responses are as important as the personal experiences.*

Table 5.14 (c) **Weighting and Ranking of STD-cores**

Places	Core Status (f & Weight)				Total Weight ($W^1 + W^2$)	Rank
	f^1	W^1	f^2	W^2		
Institutional Sex-spaces						
Bagerhat	2	2	6	3.0	5.0	12
Faridpur	16	16	22	11	27.0	4
Jamalpur	3	3	15	7.5	10.5	8
Jessore	13	13	31	15.5	28.5	3
Jhalakathi	0	0	0	0	0.0	14
Khulna	6	6	8	4.0	10.0	9
Magura	1	1	11	5.5	6.5	10
Mongla	7	7	18	9.0	16.0	7
Mymensingh	6	6	23	11.5	17.5	5
Narayanganj	12	12	60	30	42.0	1
Patuakhali	3	3	5	2.5	5.5	11
Rajbari	21	21	41	20.5	41.5	2
Saidpur	4	4	25	12.5	16.5	6
Tangail	2	2	5	2.5	4.5	13
Anonymous places on major routes						
Dhaka-Chittagong	38	38	77	38.5	76.5	1
Dhaka-South	20	20	34	17.0	37.0	3
Dhaka-North (Rajshahi)	18	18	43	21.5	39.5	2
Dhaka-North (Dinajpur)	15	15	17	8.5	23.5	5
Dhaka-Sylhet	09	09	30	15.0	24.0	4
Dhaka-Mymensingh	03	03	11	5.5	8.5	6

Note: *The responses regarding the STD-core were taken in two forms, first, from the STD sufferer respondents' own experience of the origin of their STD incident. Simply questioning the respondents to recall from where they acquired their STD. Second, question was raised to all samples regarding their indirect experiences of STD origin. This certain but indirect empirical knowledge is expected to be earned from their infected peers. Needless to say, the value of these two forms of data is not same, because of their nature. Thus for more validity, a weight value was judgmentally imposed for this two forms of data, such as:*

- f^1: *Places named by the respondents as their personal experience (given value =1.00)*
- f^2: *Paces named by the respondents as know certainly from others' experience (given value =0.5)*



Source: *Field Survey. 1997*

Figure 5.9 *Spatial distribution of STD-cores. The figure also shows the ranks of the rate of occurrence of STD in the both of institutional and hidden STD-cores as perceived by the respondents. Hidden STD-cores are seen to be plotted on the major truck routes.*

5.5.3 STD-cores and Sexual Networks: Spearman's Rank-Order Correlation

One of the basic assumptions of the present research is that heterosexuality primarily causes of the incidence of STD/AIDS (*vid.* Chapter 2). Therefore, the whole research designed to cover this central theme from spatial point of view that spatiometric network of truckers' sexuality shapes the spaces and specific locations on it vulnerable to STD/AIDS. The previous sections of this chapter, however, explained with several predictions how this happens and finally produces the STD-core as empirical evidence of these predictions. The STD-cores are at a glance seen to be correlated with the sexual networks. But how far the relationship between these two variables in important to explain.

For this, first, a scatter diagram is developed in which an overall picture of the relationship is seen. The diagonal line indicates the perfect positive correlation between the variables ($r = +1$). The diagram also shows the both residuals indicating the variance from the perfect correlation line. Residuals with dotted line indicate the higher degree of sexual networks over the degree of STD-cores. In other words it means that these stations have more sexual networks than the degree of STD-core. Thus these stations are showing less relationship. Similarly, the residuals of STD-core refer to the higher degree of STD-core of particular station over its degree of sexual networks. Then these locations are also showing less relationship. Besides, the diagram shows trend of the degree of sexual networks in relation to the degree of STD-core. The top corner of the extreme left indicates both the highest sexual networks' value as well as of STD-cores, which gradually decreases towards the extreme right of the lower part of the diagram. However, whatever the position on the top or on the lower part of the diagram is no matter, rather the closer position to the diagonal line, the more relationship between the variables. Therefore, it is evident that there are 6 stations on the diagram have the highest co-relationships, which in

turn means the 40 *per cent* high correlation exist between the variables. In addition, the rest except four stations namely Tangail, Khulna, Faridpur, and Jessore, are not so far from the perfect correlation line. The scatter diagram, therefore, ascertains the clear relationship between the variables. Nevertheless, it does not make any quantitative measure and unable to test the relationship in terms of mathematical-logical frame to determine whether the relationship is acceptable or not.

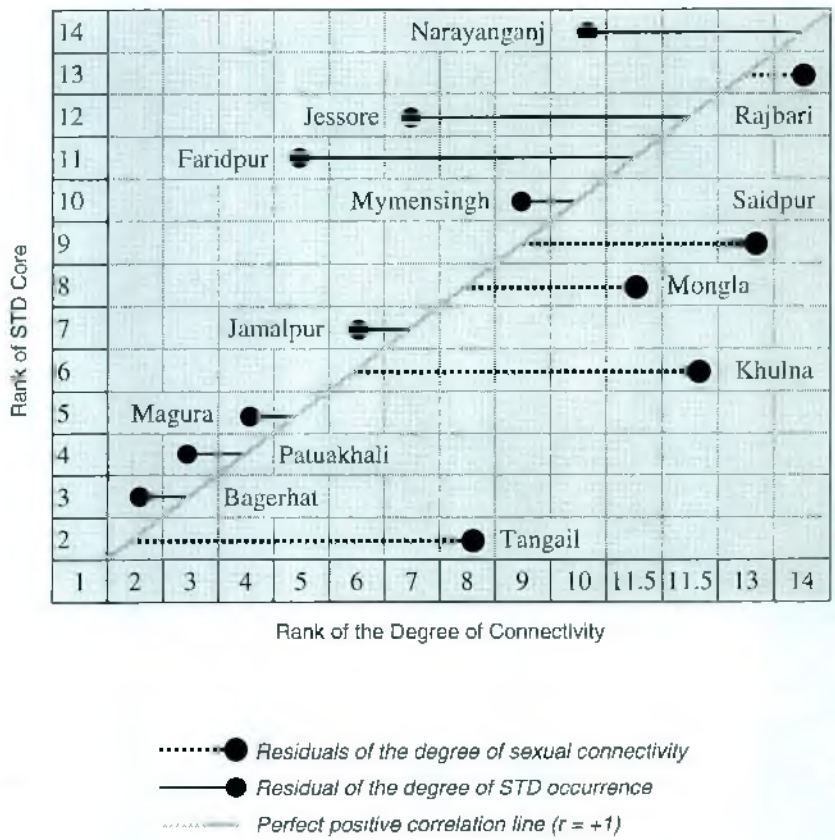


Figure 5.10 *Scatter Diagram shows the correlation between the variables of sexual networking and STD-core.*

Therefore, in the second stage, an endeavor to test the relationship between these two variables has been made. For many practical reasons including conveniences and limitations, the Spearman's Coefficient of Correlation (r) has been taken for consideration. At least three distinct reasons may put here. First, since the relevant data were taken from respondents' perception and were measured at the rank scale or subsequently ranked, then the rank-order correlation coefficient was mandatory. Second, The form of the trucker population (population universe) is not clearly known, and the sample is too small to give a precise picture of the population distribution. In this case, rank correlation of coefficient is appropriate. Third, since critical analyses of data were done either manually or with electronic calculator, and not been used computer, then computational simplicity of rank correlation was taken into consideration (Norcliffe, 1977; Haring & Lunsbury, 1971).

Table 5.15 shows the details of the process and the environments under what bases the coefficient of correlation was made. The total of 14 stations are converted to the rank scale and ranked smallest to largest as per the basic principle of the Spearman's coefficient of rank correlation, which is clearly opposite to the ranking that assigns earlier in the present thesis. The stations are ranked form 1 to 14, and in the case of 'X'-rank, two institutional sex-spaces namely Khulna and Mongla (both have rank of 11.5=), are tied equal (Table 5.15). This single tie present in X would have very little influence on the value of r, hence the correlation for tied ranking was not used. Since r was tested for significance using the t distribution, thus in this case the test was one tailed and the $v = 12$ (14-2). Consulting the Statistical Table of Critical Value of t (t-Table) with 12 degree of freedom was selected as $t_{0.01} = 2.68$. Then r was converted into t value for assessing the significance of r with given formula shown in Table 5.15. Thus comparing the t value to the critical value,

$t\alpha$, (less than or equal to 2.68), it is possible to accept or reject the research assumption.

However, the result of the computation table shows that Coefficient of Correlation, $r = 0.6098011$ and the Coefficient of Determination, $r^2 = 0.37191166$. This indicates that 0.37 of the variation of STD-cores is explained by the sexual networks. While as shown in the computation table, $t = 2.6654805$. The value is a little bit less than the critical value (2.66). Thus the assumption (H_0)– the degree of sexual networking and the degree of STD-core are significantly associated– may be accepted with conditions. This means as discussed in the earlier sections that STD-cores are being originated and magnified primarily due to sexual networking along with other factors *viz.* size of the sex-spaces, remoteness, treatment and other intervention measures *etc.*

Finally, although not studied in details, yet seems to be appropriate to make some comments about the correlation between the hidden STD-cores and the truckers sexual networks. A comparison of the Table 5.14(c) for STD-cores and the Table 5.2 for route prone to hidden sex-spaces may give some insights of their correlation. It is rather seen that hidden STD-cores are more related with the networks of hidden sex-spaces. The tables (Table 5.2 and Table 5.14c) show that the route Dhaka-Chittagong is equally reported as the highest route prone to hidden STD-core and hidden sex-spaces. This simultaneousness also found for others routes except in one case with very insignificant variation. Even it is also evident elsewhere in the thesis that both the rates of sexual activities and the incidence of STDs in hidden sex-spaces are higher. This picture eventually makes the fact that hidden sex-spaces, their networks and STD incidences as well as interventions needs are equally, even more important to be studied in details.

Table 5.15 **Computation of the Rank Order Coefficient of Correlation**

Observations	Degree of Sexuai Connectivity	Degree of STD-core	'X'-Rank	'Y'-Rank	d	d^2
Jhalakathi	19.07	0.0	1	1	0	0
Bagerhat	33.05	5.0	2	3	-1	1
Patuakhali	34.32	5.5	3	4	-1	1
Magura	49.57	6.5	4	5	-1	1
Faridpur	54.66	27.0	5	11	-6	36
Jamalpur	57.20	10.5	6	7	-1	1
Jessore	67.37	28.5	7	12	-5	25
Tangail	68.64	4.5	8	2	6	36
Mymensingh	78.81	17.5	9	10	-1	1
Narayanganj	82.62	42.0	10	14	-4	16
Khulna	92.79	10.0	11.5 =	6	5.5	30.25
Mongla	92.79	16.0	11.5 =	8	3.5	12.25
Saidpur	113.13	16.5	13	9	4	16
Rajbari	127.11	41.5	14	13	1	1
					$\sum d = 0$	$\sum d^2 = 177.5$

Note 1: *Shaded row indicates the median of the table*

Note 2: *Ranked data has the characteristic that the interval between successive observations is fixed at unity, except in the case of ties (Norcliffe, 1977). Thus the 14 observations are converted to the rank scale and ranked smallest to largest as per the basic principle of the Spearman's coefficient of rank correlation, which is clearly opposite to the ranking that assigns elsewhere in the present thesis.*

Spearman's Coefficient of Rank Correlation,

$$r = 1 - \frac{(6 \sum d^2)}{N^3 - N}$$

∴ Coefficient of Correlation, $r = 0.6098011$

Then, Coefficient of Determination, $r^2 = 0.37191166$

$$t = r \sqrt{\frac{N-2}{1-r^2}}$$

$$t = 2.6654805$$

Where,

$N = 14$

$v = 14 - 2 = 12$

$\alpha = 0.01$(12 degree of freedom $t.01 = 2.68$)

5.6 Geographical Determinants of the Vulnerability: Spatiality, Temporality and Mobility

The foregoing sections show some spatial aspects of the vulnerability to STD/AIDS including the prediction of locations most likely to be infected with STD and AIDS. But the question still very inevitable that how and why a location becomes vulnerable? Is there any locational or local environmental or ecological factors as well as socio-economic, psychological factors are playing role in this regard, and if so, how and why? These questions are absolutely *geographical* and important to know for ensuring any successful intervention with cost-effective manner. This section of the thesis focuses these quarries of the present research.

These geographical questions, however for convenient of arrangement, can be categorized into the following manner:

- Mobility and vulnerability;
- Spatiality, locational dynamics and vulnerability
- Temporality, seasonality and Vulnerability

5.6.1 Mobility and vulnerability

Mobility, the most exercised concept in geography, has already been established as one of the background factor of STD/AIDS and much has been cited in the review section of the present thesis (*vid.* Chapter 3). Nevertheless, some of the related issues were also raised once again and tested with different quest in the field. One of such is that whether the several selected risk behaviors *i.e.* having sex with CSWs and taking alcohol are routine way of life of the respondents or merely an irregularity on their trajectory of trucking life. Table 5.16 shows the facts as mentioned by the respondents in context to their whole life.

The Table 5.16 shows that there is a distinct relationship between mobility and risk behaviors like sexuality and alcoholism. Respondents were asked as to

what scale they involved with these risk behaviors in different locations in their professional as well as family life *viz.* at home, at work place (original stand: O) and on the way of the journey. The answers were taken in context to their whole trucking life and were weighted in terms of response scale (*i.e.* point scoring), and were indexed accordingly.

It is evident that both informal sexuality and alcoholism are not domiciling activities. Therefore none one was found to have had informal sex on regular basis while they were at their home. This was also true for alcoholism, of such none found as home-based, except two cases whose extreme drug induced state pursued them to take alcohol regularly even while they were at their home (Table 5.16). While a few of respondents were found to have had sex and alcoholic behaviors on different scale at their work places. These places are characterized by the original node of truckers' movement from where they start journey; their owners live in; or the garage of the truck is located; and they have to turn back to these locations. For example, a truck's permanent stands in Tejgaon, and thus ultimately it becomes the original work-places (O) for the respective trucker. Truckers have to busy with finding customers, dealing with the owners, parties, and union affairs and with other professional duties at this location. Hence little time in hand to think otherwise. Nevertheless, a very little portion is seen to be engaged in both risk behaviors on regular basis in the work places. This segment becomes habituated. Even a good number though had sex and alcoholic behaviors at this location, but not on regular spirit. But the most striking feature is that both the behaviors are found on different scale among large number of cases at the stopovers on the highway. Candidly except a single case, none was found to not having sex as well as alcoholism during the times on the way of trips. Moreover, huge number of respondents disclosed that they had regular sex and alcoholic practices while they were on the movements.

While 'oftentimes cases' are very common on the highway. Some respondents opined that trucking and sexing is inevitable, and to them, alcoholism rather helps in long and smooth driving. Most seemingly this is why truckers are publicly known as 'drunkards' as well as 'hot-men' and bad social images are being created.

Table 5.16 shows that risk behaviors at home are weighted and indexed to a value of only 13.5 and 0.02 respectively. The index value implies that only 2 *per cent* had risk behaviors at home. On the other hand, 37 *per cent* had at work places (weighted value = 161.5 and index value = 0.336). But over 60 *per cent* had both risk behaviors while they were on the movement (weighted value = 292.5 and index value = 0.609). The ranking of these places shows locations on way of trips as the most vulnerable to STD/AIDS followed by those of at work place and at home.

The weighted and index value of the column total shows the pattern of individual risk behavior of sexuality and alcoholism among the respondents. These figure shows on average 25 *per cent* of the respondents (weighted value = 181.5; and index value = 0.252) are sexually at risk and 39 *per cent* (weighted value = 286; and index value = 0.397) are from alcoholism. These figures are average values disregarding to the scale of risk behaviors *i.e.* disregarding the scale of regular vs. often or ever vs. never basis responses of the sample respondents. Thus the average figure of sexuality (25%) and alcoholism (39%) may consider as standard or base value for further inquiries and analyses on the issue of the vulnerability to STD/AIDS among trucker community in Bangladesh.

Thus the above cross-sectional weighting-indexing analysis of risk behaviors in relation to locational identity clearly makes the fact that risk behaviors of the truckers are space oriented and highly related to their mobile life. Truckers engage with irregularities while they were on the way of a trip. Thus these risk behaviors can also be termed as 'mobility-related-behaviors'.

Table 5.16 **Mobility and Risk Behaviors**

Places	Response Scale	Scale Value (s)	Selected Risk Behaviors				Total Score (W^s+W^a)	Index Value* & (Rank)
			Sexuality		Alcohol			
			f	W^{-s}	*f*	W^a		
At Home or with family	Never does	0	236	00	219	00	00	
	Often does	½	04	02	19	9.5	11.5	
	Always does	1	00	00	02	02	02	
	Section total		**240**	**02**	**240**	**11.5**	**13.5**	0.02 **(3)**
At Work Place (O)	Never does	0	191	00	13	00	0	
	Often does	½	36	18	193	96.5	114.5	
	Always does	1	13	13	34	34	47	
	Section total		**240**	**31**	**240**	**130.5**	**161.5**	0.336 **(2)**
On Journey or in the way	Never does	0	00	00	01	00	00	
	Often does	½	183	91.5	190	95	186.5	
	Always does	1	57	57	49	49	106	
	Section total		**240**	**148.5**	**240**	**144**	**292.5**	0.609**(1)**
Column total of weighted & **(Index value**)**			181.5 **(0.252)**		286 **(0.397)**			

Source: *Questionnaire Survey, 1997*

Note: *Work-places the original node of truckers' movement from where they start journey; their owners live in; or the garage of the truck is located; and they have to turn back to theses locations. For example, a truck's permanent stands in Tejgaon, and thus ultimately it becomes the original work-places (O) of the respective trucker.*

***Index Value** *(of row total)* = $\frac{\Sigma(w^s + w^a)}{N \times 2}$

Where,
- w^s = *weighted value of respondents' sexuality (row value)*
- w^a = *weighted value of respondents' alcoholism (row value)*
- $N \times 2$ = *total respondents (240) x 2. Since the responses were taken twice in the form of sexuality and alcoholism, then it was needed to doubling the sum of N.*

****Index Value** *(of the column total)* = $\frac{\Sigma(w^s)}{N \times 3}$ *and* $\frac{\Sigma(w^a)}{N \times 3}$

- w^s = *weighted value of respondents' sexuality (column value)*
- w^a = *weighted value of respondents' alcoholism (column value)*
- $N \times 3$ = *total respondents (240) x 3. Since the responses were taken thrice in the form of three locations viz. at home, at work place, and on the journey, then it was needed to tripling the sum of N.*

5.6.2 **Spatiality, locational dynamics and vulnerability**

Though, as explained just in the earlier section that trucker risk behaviors are preeminently mobility related, yet space aligned. Needless to mention that truckers have to stay or single out somewhere on their way for performing risk activities. Therefore, It is now inevitable to know in which locations of their trips they used to have stopovers. In other words, which locations are suitable or responsible for engaging risk behaviors and what are the locational suitability of that places or to wit about the locational properties that make specific places suitable or psychologically make truckers critical for engaging risk behaviors. This next section is designed to know this.

In the beginning of this chapter it has shown that truckers' sexuality essentially located in certain spaces, which termed as sex-spaces. It has also shown that these locations are stopovers, transit points, ending ports or truck edges, and starting stand (O). These places are truck terminals, stand, stoppages, parking lots, or other form of truckers' places. Since sexual activity and other risk behaviors characterize these places, then these places are identified as vulnerable locations. Moreover, a qualitative explanation of the question "how these locations become vulnerable" however can especially be made with the method of contextual mapping of particular locations. Therefore, contextual mapping of the selected sites for the present research were done in details and are shown and explained in the following figures of Figure 5.11, Figure 5.12, Figure 5.13, Figure 5.14 *etc.* along with detailed interpretation respectively. In short these figures make the fact that the contextual features and its critical spatial organization may lead a location towards the vulnerable to STD/AIDS, specially for the people like trucker who are deeply concerned with such locations. Thus the question as to how these locations become vulnerable has been answered.

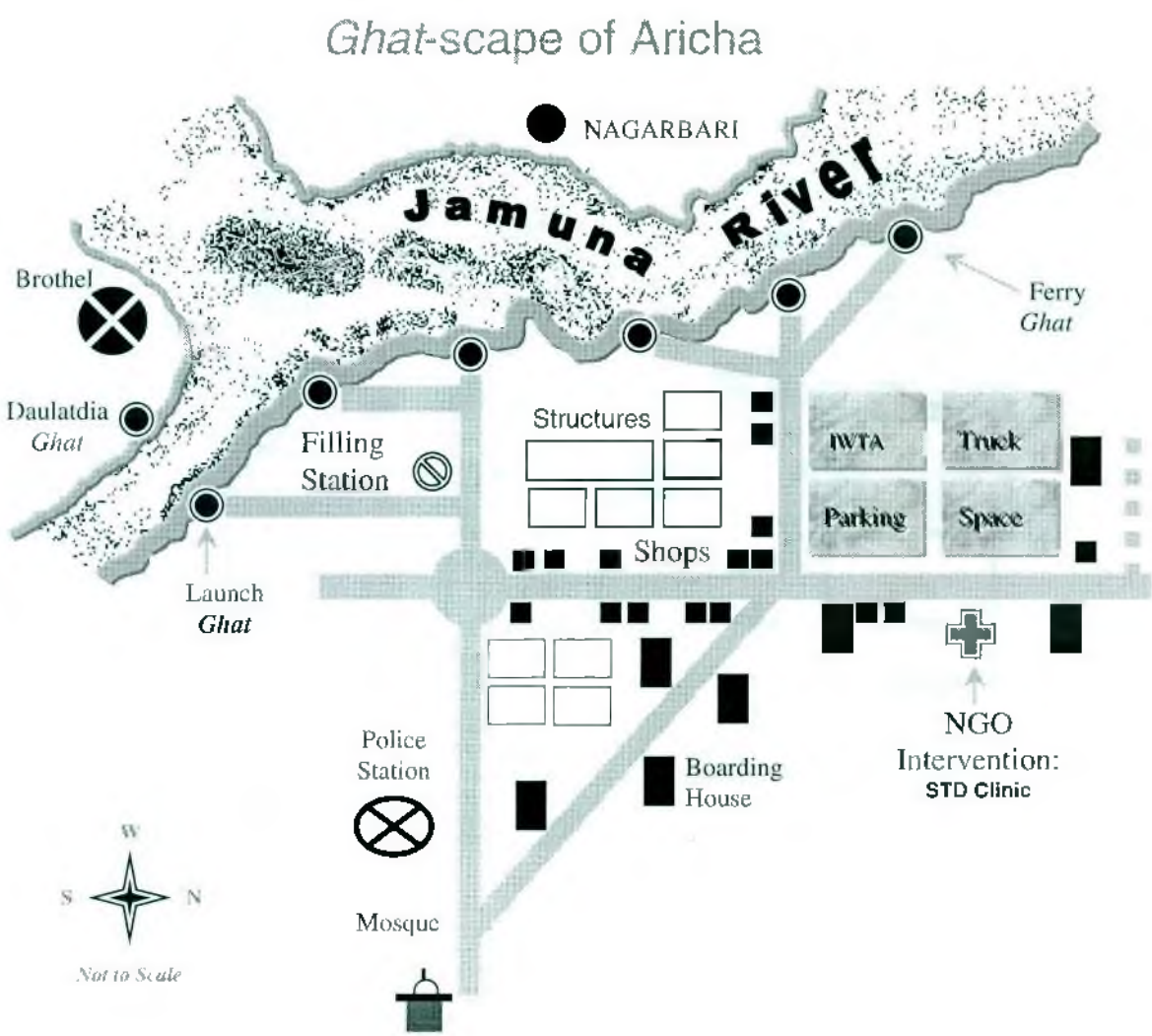


Figure 5.11. *Sketch of the landscape of Aricha Ghat, the one of the four study sites of the present research. Verily the area is an 'Union' (lowest order of administrative unit in rural settings) under Shivalaya Thana (administrative unit) of manikganj. It is the largest ferry ghat (jetty) in the country connecting the southwestern districts through Daulatdia ghat of Rajbari and northwestern districts through Nagarbari ghat in Pubna. The later is the ever-longest transit in the country and it takes two to five hours to transit through. Thus it becomes a strategic location in which truckers all over the country have to pass through. With this advantage a foci has developed over an area of one sq. mile. Scrawnier shops, hotels, semi-pucca two-stored Banglo typed boarding hoses and other kutcha structures, characterize the area. However, the ferry ghats and large truck parking lot are the key installations in the area. But the most stunning feature is that of the biggest 'red light area' on the opposite bank of river Jamuna at Daulatdia. It takes hardly half an hour by launch or ferry to reach the brothel. Every day nearly 40 per cent of the total truck trips in the country trickles through Aricha. Thus a total of nearly 2500 trucks arrive at Aricha, in each day and of them 1800 board on the ferry and the rest waiting at the BRTC's parking space for next day serial. Even they have to detain least a day to a week at best. No resting places, sanitation or recreation facilities available here for these indolent truckers. Hence under the circumstance having sex deals are no more surprising happenings. All these together make location vulnerable especially for the truckers. However, recently an NGO started interventions here to prevent STDs /AIDS among truckers.*

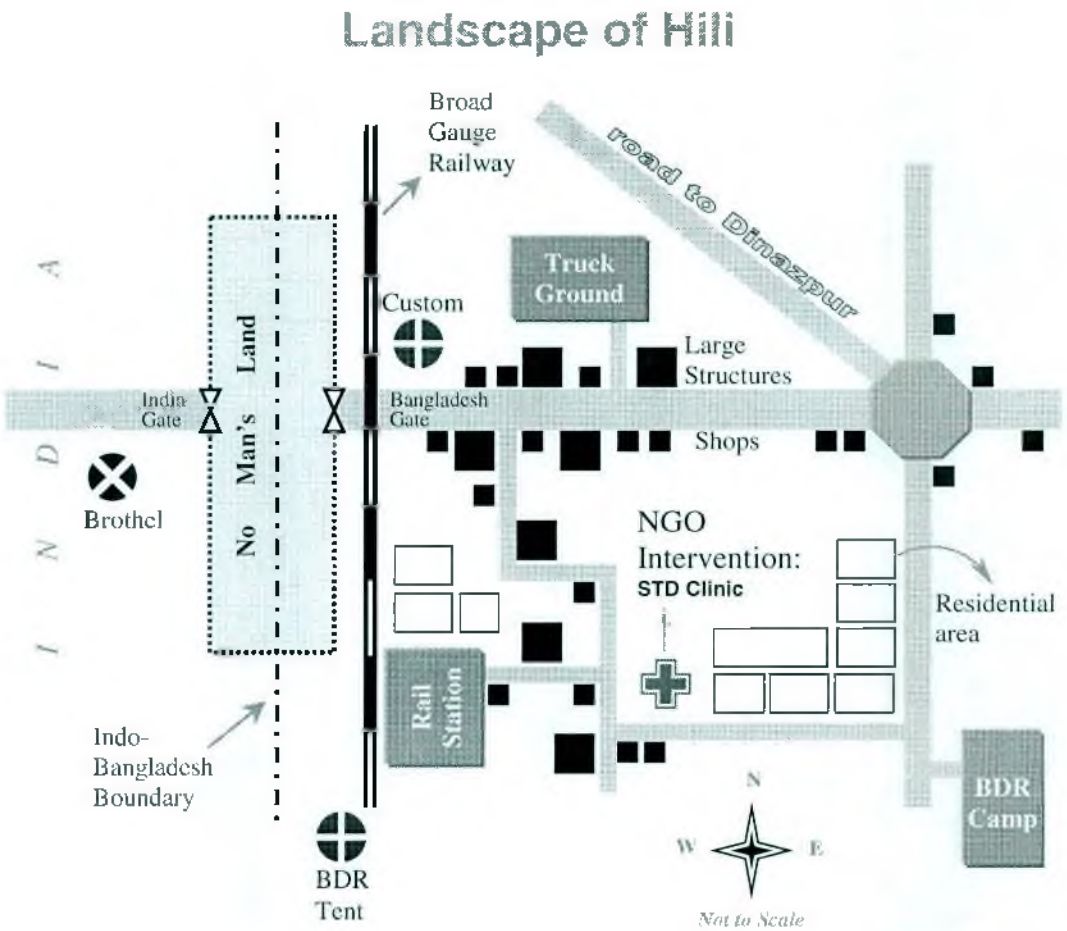


Figure 5.13 *A bird's view shows the contextual map of the environs of Hili, the N-th researched site on the selected sample line of Dhaka-Benapole-Hili highway. It is an another important transit laying on northwestern Indo-Bangladesh international frontier line at Hakimpur Thana under Dinajpur district. The area is locally known as 'Bangla Hili' characterized by a small urban center and recently declared as a land port. The famed western railway tract goes on its extreme west-edge of the area, which also demarcates the Indo-Bangladesh territory line. Similar to that of Benapole, everyday both trucks from all over Indian and Bangladesh rush into Hili and have to stay several days for loading or unloading goods. No commercial boarding or such facilities found to be available for the outlanders in the area. Trucker used to stay on their truck, union or syndicate offices, or in the rail station. The area is an El Dorado for the smugglers. Even some miserable women are found to be concerned in the iine. These women are also partly engaged in floating sex industry. Moreover, there is a brothel in Indian part just across the boarder. Surprisingly, some of the sample respondents said to the researcher personally that they got once more chance to cross the Indo-Bangladesh border without passport-visa through several transit points like Hili and called upon Indian sex workers. The process of this illegal visitation is merely simple. As mentioned earlier that Indian truckers have the legal access to some extend into Bangladesh at several transits. Using the 'Truckers-brother' slant Bangladeshi truckers sometimes take a leave with the Indian trucks to visit there. India brothels are is one of fast growing STD/AIDS epicenters in the present world and with these channels it may spread to Bangladesh. Thus these locations are highly vulnerable to STD/AIDS.*

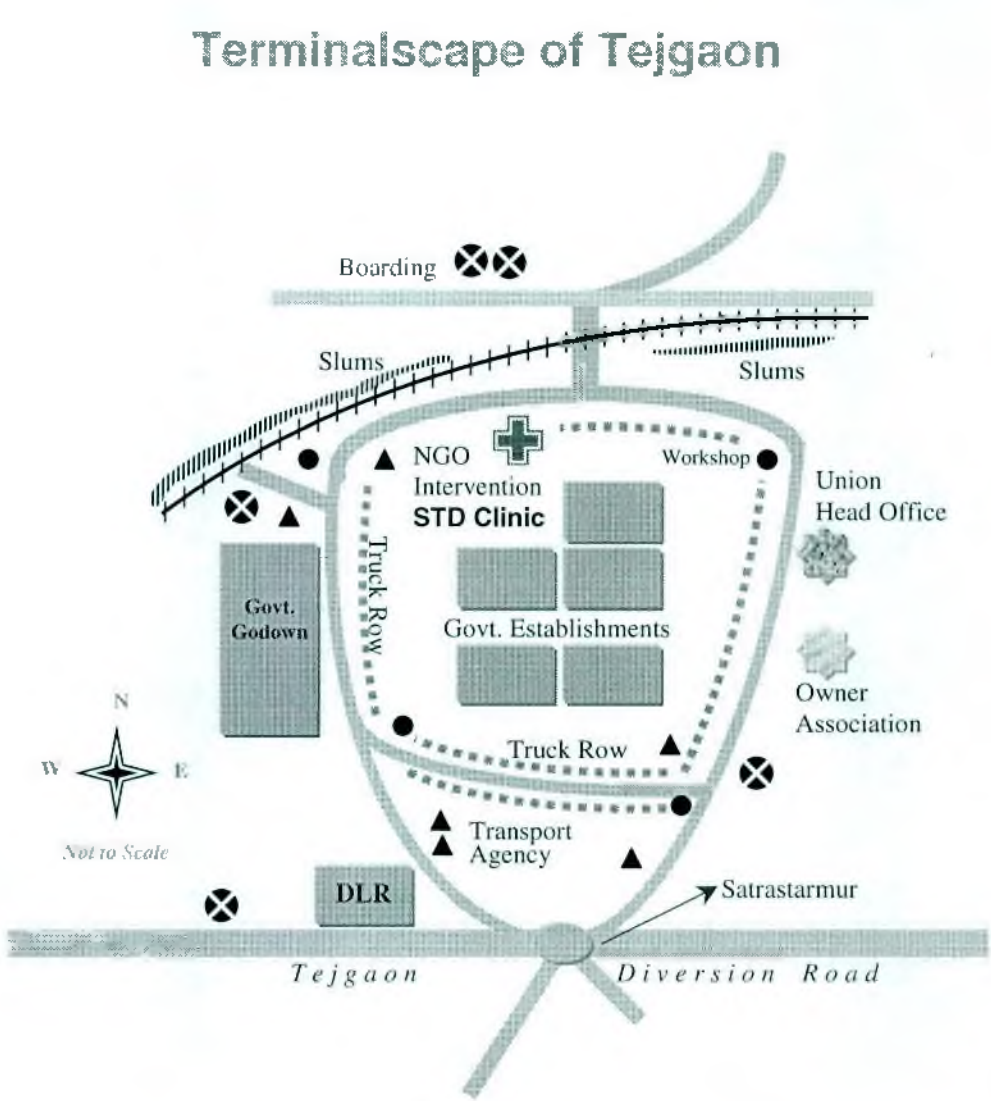


Figure 5.14 *A panorama of Tejgaon truck stand, one of the sample study sites of the present research. The site is publiciy known as the central truck terminal, but not indeed. Since the site is not formally developed by the city authority. It is needed to note here that there are two properly developed truck terminals in Dhaka, of which one at Dyaganj and other at Mirpur. However Tejgaon is the ever largest and oldest truck stand in the country and informally playing the role of national truck terminal. The area located at the heart of the city and characterized by presence huge number of trucks, central union office, head office of the owner association, numerous small workshops, transport agencies, and government establishments. Surprisingly, except the two-stored union office the area in true sense belongs no recognized facilities of a ordinary stand let alone terminal's. But it uses as a national truck terminal. Nearly thousands of trucks enter here and go out every day. But there is no parking ground; rather just truck stand on the road; and truckers are found working here and there. No properly developed resting-place, sanitation or others facilities found to be available which are badly needed especially for the outlanders. While some worsted to medium conditioned boarding houses are found, which are suspected to be 'Red Light Areas'. Similarly large slums along the railway tract or on roadside, and also the nearby rail station or the left over rail wagons are also suspected sex-places for the truckers. All these locational characteristics together shape the area vulnerable to STD/AIDS. However recently an NGO namely Paracharja introduced a STD clinic for the truckers.*

Yet the question as to why *i.e.* causes of becoming vulnerability of these locations is still ahead to know. And to know this a cross-sectional analysis termed as 'spatio-psychometrics analysis was performed. This analysis consists of diagonal plotting of psychological data into spatial perspective. The detail of the analysis is as follows.

First, the respondents in general were asked how they usually made decision or made-up their mentality about visiting brothels or doing other risk behaviors? The detailed statements of the respondents were then grouped into four general circumstances. These four general situations may now illustrate hereafter with the four typical statements of the sample respondents.

a. Mr. $\mathbf{x}^1$, a long-distance truck driver (married, age: 47, education: Class 5 standard), being recruited as a sample at Aricha and was duly interviewed on 11 November 1997. He has been with the trucking line over a period of 30 years. He stated, " ... *say, I've stopped at Aricha to get the serial. It may take few hours to several days.... I have nothing to do there. and I know that there is a brothel at Daulatdia, just across the river... my mind twist me 'come-on'... to visit....*"

b. Mr. $\mathbf{x}^2$, (married, age: 34, education: primary level), being a selected sample from Aricha, pointed out, "*we the people are bad in all backgrounds...we have huge black money earning through unusual means... and all these spent on buying sex and other bad practices... black money always pays out on black way... if you had, you will do the same as the trucker does...even sometimes I turn good, when my pocket goes down.*"

c. Mr. $\mathbf{x}^3$, (married, age: 53, education: can read and write), was interviewed at Tejgaon. As to the development of mentality he noted "...*Once I have*

had such bad habit.. now I rarely find charm...I took some Kabirazi (herbal medicine),..nothing happens..I am getting old...age is important.."

d. Mr. **x**[4], (married, age: 41, education: Class 10 standard), recruited at Aricha. He mentioned, "*at Aricha we have enough time...no way to use time...then...just for passing time...*"

The above exemplary four statements indicate four basic elements in making mentality of respondents or being decided to visit sex workers or to engage in other high risk behaviors in a particular location. These are as follows:

- There must have a brothel or floating sex workers_ **Spatial;**
- Have necessary money or other in way managing the cost_ **Economic**;
- Sexual potency or impotency_ **Biological**;
- Have enough time to do_ **Temporal**;

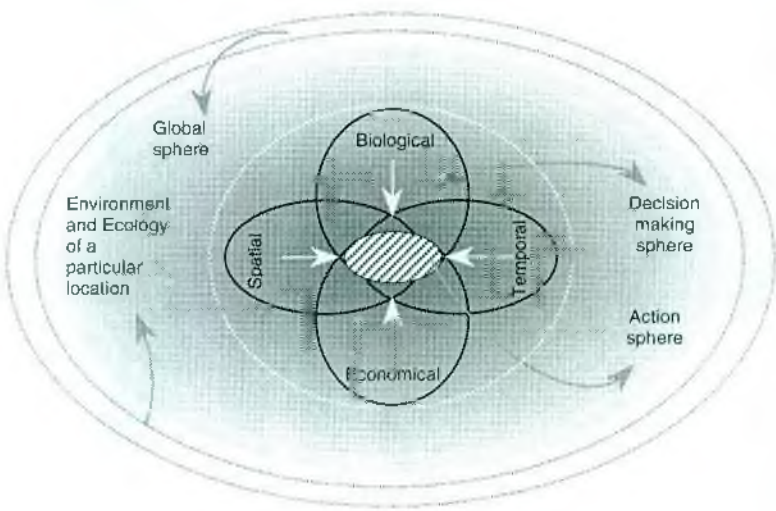
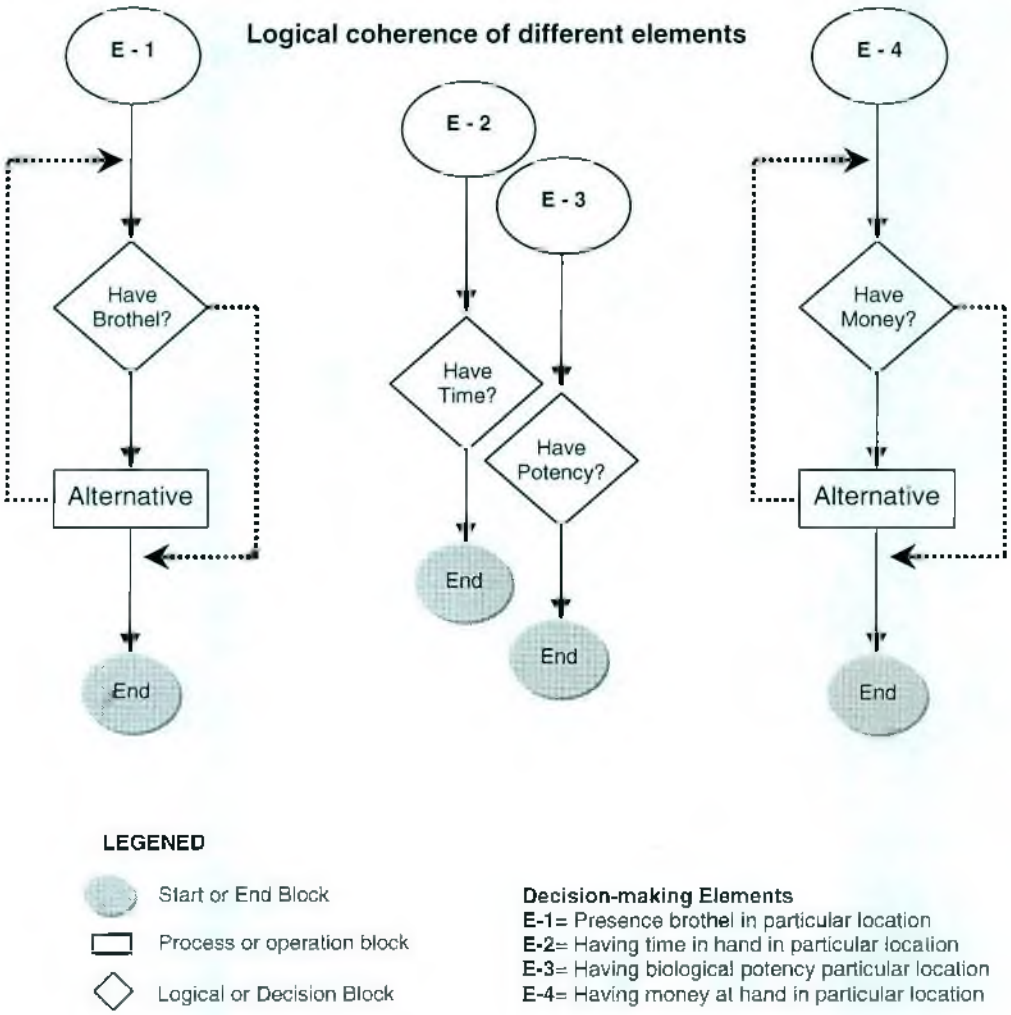


Figure 5.15 *Basic elements and their functioning in making decision of engaging risk behaviors at particular location. The figure also shows the other spheres of influence in making decision. The action sphere is placing in the core that meaning it dependency on other encompassing spheres.*



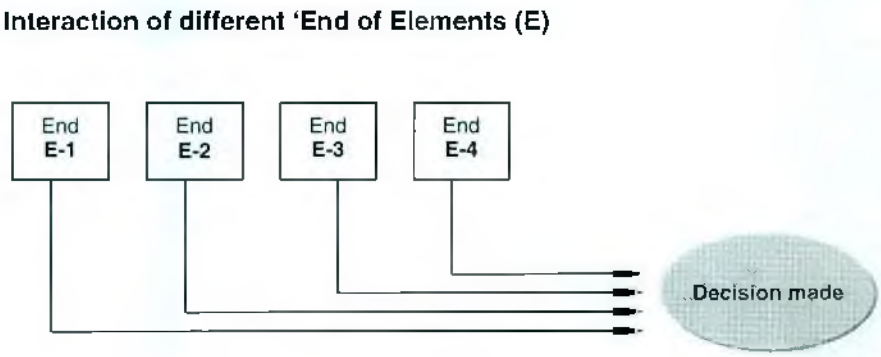


Figure 5.16 *Flowchart shows the linear algorithmic logical coherence of different elements and their functional interaction in making decision by truckers regarding the risk behavior of sexuality in particular location.*

These four elements are somehow must in making up mentality. Absence of one of such elements at particular location must reduce the chance to happen risk activity there. For example, if there is no brothel or floating CSWs at a location, whatever the other situation is, there is no chance to be performed sexual activity three. Similarly if a trucker does not have necessary money or he unable to manage the cost by other ways, he will very likely fail to perform risk activity. While sexual potency is also another basic requirement in making decision. An impotent person by no means can make a decision for having sexuality. Finally, if the trucker turns into heavy workload and absolutely unable to manage time, then assuredly he turns away the risk circumstances. However, these elements can also be characterized as locational, economic, biological, and time factor respectively (Figure 5.15).

Figure 5.15 shows the combination of these four basic elements and other zones of influence. The logical coherence of different elements and their functional interaction in making decision of risk activities is also illustrated in the Figure 5.16. The interaction of four basic factors form a sphere, which termed as 'Decision-making Sphere'. Within this sphere a trucker has to make-up his mentality about risk behaviors and actions. The algorithmic programming of Figure 5.16 shows how a trucker usually directs to sexuality in a particular location. Thus the 'Action Sphere' is shown in the core of the Figure 5.15. Two other spheres are also shown in the periphery, which have influences on the both decision-making and action spheres.

Second, then the respondents were asked, under what circumstances they become stimulated or what are the background factors that help them in making decision of risk activities. The previous section shows the basic elements of decision-making sphere and its functioning. But it is evident that the whole decision-making process itself determined by the outside environs, which includes something within the locality where decision of performing risk behaviors is made as well as global

factors laying beyond that location. Both of the spheres of influence are shown in the Figure 5.15 in which they are spacing orderly encompassing the action sphere and decision-making sphere. These orderly placement of four spheres indicates that the action of risk behaviors depend on the mentality *i.e.* the decision making process of the respondents. While the mentality of performing risk activities does not developed suddenly or not merely it happens for the interaction of the four basic elements of decision-making sphere. Though these four elements are fundamental in making decision, but other than these, some outsiders' factors also playing substantial role in making decision. Thus these remote factors are need to be searched. The respondents were then questioned as to what factors within the locality of a particular place where they had risk activities or factors beyond the locality that they thought to be very likely creating their mentality towards risk activities. The question was indeed difficult to answer. Hence several related but indirect questions and necessary explanations were also provided to the respondents. Even the respondents were simply asked about the location and trip specific hazards that thought to be irritating and disharmonized their mentality. However, all the factors as mentioned by the respondents were picked from the narrative statements of the respondents through key word marking and content analysis and were arranged in the Table 5.17.

There are as many as 26 identifiable factors are recognized. Nearly a half of them are particular location specific and others are global in origin. This is meaning that a good number of factors originated within a particular location, and the rest are originated beyond the location. All the factors are subjectively categorized in terms of its nature. The categories are Professional, Social, Community & Personal, Economic, Chemical, Spatial, Ecological & Environmental, Psychological *etc.* It is seen that a good number of factors are of spatial, ecological, and environmental, which is indeed of geographical seasoning.

Table 5.17 **Perceived Factors in Making Decision for Performing Risk Behaviors**

No.	Factors	Location		*f*(N=240)	Type
		Local	Global		
1	Long absence from family		✓	121	Professional
2	Excessive work load		✓	102	
3	Lack of interest in work		✓	19	
4	Client pressure		✓	13	
5	Union pressure		✓	09	
6	Owner pressure		✓	31	
7	Peer pressure	✓		134	Social , community & Personal
8	Being a *Banda* or *Babu*		✓	02	
9	Lack of conscious		✓	39	
10	Lack of education		✓	21	
11	Unusual means of earning	✓		72	Economic
12	Strong dieting	✓		12	Chemical
13	Alcoholism	✓		43	
14	Hit of the vehicle's engine		✓	11	
15	Lack of recreation	✓		36	Spatial, Ecological & Environmental
16	Long hours traffic jam	✓		23	
17	Police harassment	✓		105	
18	*Mastan* and tool Collector	✓		54	
19	Theft and robbery on the highway	✓		26	
20	Timing factors		✓	03	
21	Local physical environments	✓		06	
22	Climatic or seasonal factors		✓	01	
23	Place phobia/attraction	✓		01	
24	Bad social image		✓	19	Psychological
25	Habitation and physic mania		✓	07	
26	Pre-detrimental case		✓	05	

Source: *Questionnaire Survey, 1997* **Multiple answers had been considered*

Third, it now seems to be appropriate to enter into a brief discussion on these factors and their syllogism to explain the phenomenon of out-social human sexuality and other risk behaviors in the light of selected relevant existing theoretical knowledge of the science of mental disorders or psychotherapeutics. It is needed to note here that this sort of affairs is usually dealt with and explained by the psychoanalysts.

The first glance of explanation regarding the trucker risk behaviors may be thought with the premise of 'abnormality' or may be approached from the concept of 'personality disorders'. Friedland, (1991), a psychiatrist pointed out that it is important to realize that every `normal' person can experience moments or degree of emotional behavior that are maladaptive and inflexible. However there is no clear demarcation between normal and `pathological' (disease causing) behaviors. Many prominent characteristics of personality disorders including feeling anxious and fearful or being dramatic, emotional or erratic *etc.* are common. Normal behavior is flexible enough to be modified. While people with personality disorders seem unable to learn new way to behaving likely to repeat same outburst despite the consequences. This is because that their maladaptive pattern is so ingrained, in a sense, they are caught in a rut, compelled by habit to negative and inappropriate ways, and they do not recognize their actions as inappropriate. Faced with new situations, they fall back on old, maladaptive behaviors, unable to break out of the rut established earlier in their life. Therefore, truckers' repeated risk behaviors could be approached from this point of view.

Similarly, another most common explanation especially prevailing among the general people is that of so called 'Antisocial Personality'. Antisocial personality disorder is characterised by an inbred pattern of behaviour that goes against society's norms. They have need to exert control over their environment and are usually

impulsive risk taker and thrill seeker, and often to the point of recklessness. And they do not have guilty feelings or remorse for their actions. To them world is harsh, ruthless place, and to manage one should be harsh and ruthless, they have aggressive interest in sexual activity, and sometimes they lead to drug and alcohol use, promiscuity_ all these types fit the profile of antisocial personality are common in today's society (Friedland, 1991). People with antisocial personality disorder, who are sometimes referred to as `psychopaths' or `sociopaths', as a rule frequently fits into mainstream of our society, they are endorsed and cultivated in our competitive society, where tough and hard-headed realism is an admitted attribute. Such personality characteristics are often considered necessary for survival in the cruel business world, in political arenas, and military and police departments (Millon, 1981). There is little doubt that environmental factors including socio-cultural circumstances, political arenas, local conditions, insensitive business, climatic conditions *etc.* are important in reinforcing antisocial behaviour (Friedland, 1991).

The concept of stress has become a familiar one, describing the variety of physical, psychological and social problems that can cause illness and discomfort in varying degrees. Stress is the state manifested by a specific syndrome, which consists of all the non-specifically induced changes within a biological system, or in short stress can be defined as the non-specific response of the body to any medians (Selue, 1978). Stress often appears as a result of personal circumstances, but it may also be provoked by any number of environmental and socio-economic factors. Changes in season, rainfall or day light, in the tide, in the phases of moon, in the way communities are organised and interacted one another are all elements that may as stress (Gordon, 1991). The truckers work too hard and so long that they become vulnerable to stress and job burnout.

Specialist of human mind described anxiety as fear due to stress. Any kind of stress can create a state of anxiety. Anxiety usually involves the anticipation of a negative situation. When anxiety is manifested mentally, the person's attention narrows, and he tends to focus on the discomfort, feeling irritable and unsure of what will happen next. Anxiety may be beneficial. It can help person realise that danger is present and prepare him to scape it. Because it forces an individual to concentrate on the emergency at hand, anxiety may help someone solve an urgent problem. However when a person's fear seems far greater and last much longer than the problem warrant, he is experiencing an anxiety disorder. People who suffer severe anxiety are almost constantly tense, uneasy, and worried. They frequently feel depressed and have trouble interacting with other people. They also tend to have difficulty making decisions and to feel apprehensive about life. In a desperate attempt to control the anxiety, some persons with OCD turn to alcohol or other drugs. This is the way they also developed association between feelings of relief and the act of drinking, making them more likely to drink the next time their symptoms occur. (Sebastian, 1991). People who suffer severe anxiety are almost constantly tense, uneasy, and worried. They frequently feel depressed and have trouble interacting with other people. They also tend to have difficulty making decisions and to feel apprehensive about life (Nardo, 1991).

Lack of interest in one's work, as well as overwork, can cause serious mental and physical health problems including being irritated to the incidents of physical illness or various psychological disorders (Gordon, 1991).

Scientists have found that the biochemical substitutes like 'lacticacid', one of the by-products of muscle activity, has a clear impact on anxiety and phobias and this acid is found to be overproduced in the subject's body, when they worked out for extensive period. At the same time research found that alcohol can trigger panic attack or phobias, even many foods that causes allergic reactions may trigger for anxiety and

panic (Nardo, 1991). However, the respondents opined that heat of the machine (truck), high diet/rich food, alcohol sometimes electrify them towards sexuality.

The behavioural school of psychological thought credits environmental factors including socio-cultural and physical environment in determining people's actions, feelings, and personality.

Finally, truckers' risk behaviors can be explained with the concept of ' Phobia'. A phobia is an overpowering fear that involves an extreme and irrational dread of a certain object, activity, *e.g.* police phobia, dentist phobia *etc.* When phobia related to certain situation and spaces is termed as 'Agoraphobia (*Agora* = marketplace and phobia = Dread). The result of agoraphobia is that it leads to the repeated avoidance of any situation in which a person may experience this extreme fear. Many phobiac people suffer from depression, a condition wherein a person's mental and physical energy is low, or depressed. A depressed person feels sad, dejected, or a combination of these feelings (Nardo, 1991). The inner conflict caused a great deal of guilt and frustration. Freud (1856-1939) theorised that phobias are due to this displacement_ a condition that occurs when a person transfer fear of an earlier object or incident onto a more recent, often unrelated, substitute, due to inner conflict (Stein, 1984). It was event that some places are badly experienced by the truckers and they fall into stress and depressed condition when arrived in these places, which lead them irregular behaviors for a means of being relief from the situation. Even for the same reason, they were found pre-determined and habituated in engaging risk behaviors in particular location, such as Aricha. While some cases trucker found to be attracted or have peculiar craze to certain places where they want to have sex. Aricha is one of such locations for many truckers. This sort of psychology may be termed as *location mania* or what American geographer Tuan Yi-Fu (1976) named as '*Topophila*'.

However, these explanations regarding truckers' sexuality and other risk behaviors bridges a spatial aspects and psychic matters together in a common platform. In other words, psychology of truckers' risk behaviors has spatial dimension. Thus this approach can be termed as spatio-psychoanalysis. Yet there is an another dimension in geographic enquiring_ the question of time.

5.6.3 **Seasonality, Timing and Vulnerability**

Finally, this section focuses on the vulnerability to STD/AIDS and occurrence of STDs in relation to time dynamic *i.e.* seasonality and temporality, the other dimension of geographic inquiry. Some questions were raised in this regard_ in which season respondents had more sex and more incidences of STDs *i.e.* is there any seasonal variation? Is there a question of timing in relation to have sex and other risk behaviors? Is there any psychological matter in relation to timing of sexuality and other risk behaviors? In short, this section is designed to understand the timing of risk behaviors, as well as timing of psychological matters of risk behaviors. To know this once again as done before a three-ply cross-sectional analysis *viz.* times with risk behaviors especially sexuality as well as time with psychology of risk behaviors, in other words, cross-sectional analysis of time-psychology-risk behaviors. Thus the analysis can be termed as 'tempo-psychological analysis', which merely implies a cross-sectional analysis of sexuality or risk behaviors and psychology of such behaviors in relation to time perspective.

Since the field data were collected in particular period of time (September to December 1997), then it was not possible to compare the data in relation to temporal change. Even no secondary source was found to be fitted for comparison. Nevertheless, an alternative and indirect approach was mellowed and successfully put it into use for the above stated purpose. These are discussed in the below.

First, the respondents were questioned as to the seasonality of their risk behaviors and occurrence of STDs in context to their lifetime in the trucking profession. The responses were scaled in three intervals such as: "Normal", More that Normal", and "Less than Normal" *etc.* in relation to different seasons. Table 5.18(a) is an arrangement of the responses in this regard.

The upper part of the Table 5.18(a) shows the occurrence of truckers' sexuality in relation to three distinct and identifiable natural seasons in Bangladesh namely summer, rain, and winter. A total of 108 samples were able to correlate their incidences of sexuality with time dimension, while the rest 132 could not do so, which is shown in the table as NA. However, the data reveals that winter is more prone to sexual activity (weighted value = 111 and index value = 0.46) followed by summer (weighted value = 96.5 and index value = 0.40) and rain (weighted value = 79 and index value = 0.33).

The lower section of the same table (Table 5.18a) shows conversion of the upper section data in the form of trucking seasons. As mentioned else where in the thesis that there are two disunited intermissions in trucking profession termed as 'peak' and 'dull' seasons (*vid.* Chapter 4). The peak season consist of two climatic seasons of summer and winter, but the dull analogous to the rainy day of a year. This form of data indicates more sexual occurrence in the peak seasons and less in dull period. The difference in the rate of sexuality between these two seasons is just 10 *per cent* (since the index value of these two seasons is 0.43 and 0.33 respectively). Note that the difference in truck trips between these two seasons is also remarkable (25%).

Apparently, there is a direct relationship between mobility and sexuality as well as between climatic seasons and mobility. Similarly, relationship also exists between the rate incident of sexuality and climatic seasons, but the relationship is

not direct. Therefore, the functional coherence of these three elements can have been rewritten as 'climatic season → mobility → sexuality' meaning that sexuality is the function of mobility, but mobility is the function of climatic seasons. Thus it may have been concluded that climatic seasons are simply playing an intermediate role in controlling the occurrence of sexuality.

The next table (Table 5.18b) concerns with the STD occurrence in relation to different seasons. The arrangement of seasons is similar to that of Table 5.18 (a). The respondents who at least once in their lifetime had suffered in STD were requested to recall the incidence in relation to climatic seasons. All of the experienced respondents (151) were able to recall and correlate their respect incidences. Note that STD is too painful to forget. The data shows that highest cases are found in the rain, the dull seasons in the trucking industry. The figure of the rain (30.42%) is not only the highest, but clearly double to that that of winter (15.42%), the peak season in the trucking industry. This is extremely surprising and clearly contrasting to the trend of sexuality. It is well established that sexuality is basal factor of STD, while in this case, though the occurrence of sexuality found to be higher in the winter and lesser in rainy days, but conversely rate occurrence of STD is seen more in rainy season and fewer in winter. Even trucking seasons, which is directly determined by the mobility rate have shown little variation in STD occurrence, although peak season characterized by more STD incidences. This peculiarity makes the fact that there may be relationship of STD with humid climatic nature of rain days. This may be of activating of STD virus in the rainy environment or may be of going down of the immune system of human body in the same season. However, this relationship can not fully understood only with socio-geographical approach, rather further studies are strongly recommended to be approached from bio-medical point of view.

Table 5.18 (a) **Rate of occurrence of Sexuality in Relation to Different Seasons**

Sexuality / Seasons	Responses Scale (f & weights)[1]				Total Score (Σs)	Index
	More (1+0.5)	Normal (1)	Less (1-0.5)	NA (O)		
Natural Seasons						
Summer	18(27)	49(49)	41(20.5)	132 (0)	96.5	0.40
Rain	09(13.5)	32(32)	67(33.5)		79	0.33
Winter	34(39)	46(46)	28(14)		111	0.46
Trucking Seasons[2]						
Peak	52(78)	95(95)	69(34.5)	132 (0)	207.5	0.43[3]
Dull	09(13.5)	32(32)	67(33.5)		79	0.33

Source: *Questionnaire Survey, 1997*

Note [1] *: weighted value of the responses are given in the parenthesis*
Note [2] *: summer and winter = peak season, rain =dull season (vid. Chapter 4)*
Note [3] *: index value has been calculated from the base value of 480 (Nx2= 240x2). Note that the row of peak season consist of two climatic seasons namely winter and summer and each with N=240, then the N value of the row becomes double i.e. 240 x 2 = 480.*

Index value $= \frac{\sum s}{t^H} \times 0.45$ *or, can be rewrite as,* $\frac{\sum s}{N}$

Where, $\sum s$ *= Total score (in the row);*
t^H *= total number of available responses (108);*
N *= total study samples (240); and*
0.45 is a constant value. Since the total number of responses (108) is 45 % of the N (actual number of samples), then the total score (Σs) needs to be multiplied by 45% or 0.45.

Table 5.18 (b) **Seasons and STD Occurrences as Perceived by the Respondents**

STD occurrence / Seasons	Incidence (N=240)		NA[1]	
	f	%	f	%
Natural Seasons				
Summer	41	17.08	89	37.08
Rain	73	30.42		
Winter	37	15.42		
Trucking Seasons[1]				
Peak	78	32.5	89	37.08
Dull	73	30.42		

Source: *Questionnaire Survey, 1997*

Note [1] *: respondents who never experienced in STD occurrence in their lifetime*
Note [2] *: peak season in trucking includes both summer and winter, while dull season covers the whole rainy days of a year (vid. Chapter 4)*

Second, the question was asked as to the psychological matters in relation to time dimension. Respondents were then questioned as to what time they had most of their sexual acts in a particular day. Table 5.19 is designed in this purpose in which column vector shows the responses gradient regarding sexuality and the row vector illustrates the time intervals. Responses are taken in three grades namely never does, occasionally does, and ever does *etc.* While 'time' is considered with four intervals namely morning, noon, evening and night *etc.* This arrangement has made to know the pattern of sexuality in different times.

It is evident in the Table 5.19 that morning time is completely avoided by all respondents for regular sexual practice. Even most of the respondents showed 'never does' in this time. Similarly, noontime was also disregard by majority respondents. But both the times of evening and night were given higher preference for occasional practice of sex and none was found not having sex in these time points. Notice that for regular practice (termed as 'ever does') except a very few, overwhelming respondents mentioned no particular time. Similarly, no particular time is found for the response like 'Never does'. But as the most of the sexual acts were done on occasional basis, then timing specification of this basis of sex acts were clear and noon to night times were preferred for occasional sexuality (Table 5.19).

Table 5.19 **Usual Timing of Sexuality (for the most Incidents of the Respondents)**

Sexuality / Times	Responses Gradation[1]		
	Never does	occasionally does	Ever does
At morning	195	45	00
At noon	53	178	09
At evening	00	229	11
At night	00	221	19

Source: *Questionnaire Survey, 1997*

Note 1: *multiple responses have been considered*

Finally, the above analysis though gives some characteristic features of timing of the risk behavior of sexuality, but it does not gives any clue or explanation that time itself a causal factor of the incident of sexuality or even other risk behaviors. Then the question as to why particular time is responsible for having sex and other risk behaviors is still unexplained. Data in this regard were collected through the question_ is particular time change your mind to do sexuality and other risk behaviors? Needless to mention that a few respondents could able to conceive the question. In most cases necessary answers were come out as byproduct of other questions. However, for this specific question, the responses including respondents' personal feelings, emotions, cognition *etc.* regarding time factor were note in qualitative statement form. Some of the emblematic statements are quoted here along with the explanation.

However, it is seen that specific time sometimes provokes in raising personal emotion, feelings and these may lead to sexuality. The evening-circle of illumination, the period of dying-day, the point of vertical sun are the instances of critical time. These times are transitional in nature and their influences on human mind are frequently found in many classics and literatures. Interestingly common religious practices are seen to be scheduled in these periods and advice are given to followers for praying in these periods in major religions. It is already seen that sexuality in the evening is common among the truckers. One respondent stated, "evening at Daulatdia (location of a brothel just on the bank of river Jamuna) is indeed unavoidable..." Similarly, some mentioned the feelings of the workless noontime, apex of the day. To the " the time of lessening speed" which some time lead them sexuality and alcoholism.

However, there is no clear cut evidence was found about the deterministic quality of time factor in influencing sexuality or other risk behaviors. Moreover, time

sense was found different in different locations. People at Aricha may convince with the evening time, while he have no time at Hili, even may find no interest at evening at Aricha in another day. Nevertheless it does not mean that time has no role. Rather it is more pragmatic that on average sexuality has identifiable timing and this trend may be use for timing of intervention measures.

In the conclusion, above analyses can be summered to show how and why a location becomes vulnerable to STD/AIDS, which is presented in the figure 5.17. It is apparent that orderly placement of different stages make a location vulnerable as final outcome. Location of risk behaviors depend on the mentality *i.e.* the decision making process of the respondents. While the mentality of performing risk activities does not developed suddenly or merely it happens for the interaction of the four basic elements of decision-making sphere. Though these four elements are fundamental in making decision, but other than these, some outsiders' factors also playing as deterministic role in making decision. Thus these remote factors are equally important these were search and were picked from the narrative statements of the respondents through key word marking and content analysis and were arranged in the Table 5.13. There are as many as 26 identifiable factors are recognized. Nearly a half of them are particular location specific and others are global in nature. This is meaning that a good number of factor originated within the sphere of particular location, and the rest are originated beyond the location where the decision to perform risk activities is being made. All the factors are subjectively categorized in terms of its nature. The categories are Professional, Social, Community & Personal, Economic, Chemical, Spatial, Ecological & Environmental, Psychological *etc.* All these factor independent and jointly make a location vulnerable. It is however seen that a good number of factors are of spatial, ecological, and environmental, which is indeed of geographical seasoning and never

before recognized in organized way. One thing is needed to note here once again that a good number of the factors are not occurring on a particular space, but also spatial in nature. Even most of the basic factors of making decision of risk activities are of geography seasoning. Therefore, it would be an absolute unfortunate to ignore the role of geographer in prevention effort of STD/AIDS.

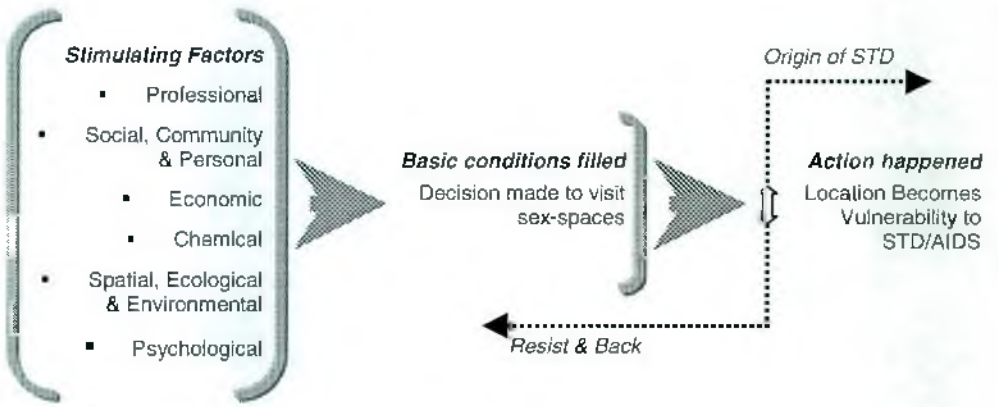


Figure 5.17. *Idealised Scheme to show the generalised process of the locational vulnerability to STD/AIDS through trucker community.*

However, It is not always as essential as shown in the Figure 5.17 in which factors are placing straightforward and their functioning goes on a linear path toward the outcome of vulnerability. It is rather more pragmatic that there might have oscillation in the process of becoming a location vulnerable. Then, the question of the degree of vulnerability arises. Logically, the degree of vulnerability is a function of the degree of evolution of different factors and their degree of interactions. Thus the vulnerability may goes down or becomes negative and backward, if there starts interventions and positive measures for lowering the influencing factors. Intensifying of positive measures of intervention may lessen the rate of vulnerability, even up to

becoming "Zero". Such an intervention as taken and forcedly implemented by the socialist government of China (*vid.* Chapter 2) is related to the wholesale eviction of brothels and other hidden sex business. This policy at a glance is impossible in a democratic country like Bangladesh. Besides, there are other criticisms. This policy is not only critical to implement, but also unsustainable and sometime may causes violation of human right and even may causes severe social, political and ethical complexities. Rather liberal strategies like health education and awareness, condomization, medicare facilities with other care and support services *etc.* are usually suggested for democratic societies instead of that of Chinese negative approach and more or less these are followed in the existing STD/AIDS interventions in Bangladesh (Khan, 1996; Chowdhury & Choudhury, 1994; Choudhury *et al.* 1992). Yet, there are some questions remaining. Such for example, how these strategies could evenly as well as cost-effectively be spatially organized; what would be the basis or logic of such spatial organization? Is it possible to develop something called spatial policy options in this regard? The next and final section of the present thesis therefore designed to show how these critical questions can be materialized and put into use for STD/AIDS interventions in Bangladesh.

5.7 Planning of Spatial Network Interventions and Follow-up System

The previous sections dealt with forecasting the spatio-temporal diffusion of STD/AIDS in Bangladesh. But how planners and decision-makers put the model into use in intervention planning for stopping the epidemic. In other words, what is the practical use of this model? Is it possible to develop any spatial strategy for interventions? Or is it possible to developed follow-up system in action programs for the mobile community like trucker. These questions are also of the basic quarries of the present research. This section, however, covers these questions with another idea, which sometimes called 'Intervention or Planning Model' in the literatures on prediction of the spatial diffusion process (Lowry, 1965; Haggett, 990).

5.7.1 Planning of Spatial Network Interventions

It is said that planning is nothing but common sense. But this sense must be rational and fact basis. In the arena of development interventions and project cycle, an abbreviation "SMART" is seen to be frequently used, which meaning that development project must be 'Simple and Sensible' (S), 'Manageable and Measurable' (M), 'Attainable and Achievable' (A), 'Relevant and Reliable' (R), 'Timely and Truthful (T). These properties are basic in designing a development intervention especially for STD/AIDS interventions (NAC, 1997). However, the research focuses only the spatial issues and properties for STD/AIDS interventions and how this can be incorporated with the STD/AIDS intervention in so-called 'SMART' way and with cost-effective manner.

To do such of spatial intervention scheme, first, the whole facts and findings of the present thesis can be used in amalgamated form so that an overall picture of the spatial organization of the locational vulnerability to STD/AIDS might be visualized. Therefore, a map integration has been made in which areal algorithm for

regionalization of vulnerable areas *i.e.* vulnerable regions; regional *K*-core, regional risk value, regional lag-times, regional linking nodes, intra-regional diffusion paths and inter-regional diffusion wave as well as spatial distribution of truckers' transit points, AIDS gates *etc.* all are seen in an integrated form (Figure 5.18). This integration was done from regional setting instead of nodal perspective as done before. Table 5.20 as whole shows the process of integration and in particular also explains in different columns the transformation process of different values in regional settings. The first column explains the vulnerable regions, which have been developed on the basis of areal algorithm of sexual networks (*cf.* areal algorithm of the Figure 5.6). The second column concerns with regional *K*-core meaning the center or most accessible location of each region (*cf.* areal algorithm procedure). The third column accounted for regional risk value *i.e.* the mean of the degree of regional contactability (*cf.* Table of MRF). Column four transforms nodal lag-times into regional average (*cf.* spatio-temporal contact probability field). How one region might link-up with other regions is shown in the fifth column. These links were also determined according to the hierarchic position of a node assigned in the original MRF. The next column shows the path in which an infection wave of STD/AIDS spills out from one region to others. While column seven explicates intra-region diffusion paths, by which STD/AIDS likely to proceed on within a region. The paths are determined as per the hierarchic order of nodes in a specific region (*cf.* Table 5.9). Group 1, for example, has 6 members such as L (with 2nd position in MRF), M (3rd position), E (4th position), B (5thposition) G (6th position), and K (7th position). Thus it may be expected that diffusion wave will follow these relative position of each node within the region. However, the whole process of integration finally put into the map as shown in the Figure 5.18, which at a glance uncovers the spatial properties of the vulnerability to STD/AIDS through truckers in Bangladesh (Figure 5.18).

Table 5.20 **Integration of Different Values in Regional Context**

Vulnerable Regions	Regional *K*-core	Regional Risk Value	Regional Lag-time	Inter-regional Linking Node	Intra-region Diffusion Paths	Inter-regional Diffusion wave
Region 1	Rajbari	0.74	4.05 months	M (3)↗F (4) ↘H (4)	L (2)↗ M (3) ↘ E (8)→B(10)→ →G (11) → K (12)	Group1↗ 2 ↘ 3, 4
Region 2	Khulna	0.73	4.11 months	F/H (4)→J (5) A (13)→ D(14)	F (4) ↔ H (4) ↘A (13)↙	Group 2↗ 3 ↘ 4
Region 3	Mymensingh	0.72	4.17 months	None	J(5)I(6)→N(7)→ →C(9)	Group 3→ 4
Region 4	None	0.19	15.79 months	None	None	None

Note: *The roman capital characters in the 5th, 6th, 7th Columns indicate different nodes and the value of parentheses witnesses the hierarchic position of each node on the MRF.*

Vulnerable Regions: *These regions have been developed on the basis of areal algorithm of sexual networks. Since sexual networks predominantly cause STD/AIDS, the degree of sexual contactability (χ^2) can also be utilized for regionalization purpose of STD/AIDS vulnerability (cf. areal algorithm of the Figure 5.6).*

Regional K-core*: This means the center or most accessible location of each region. This is also taken from the graph of areal algorithm (cf. areal algorithm procedure)*

Regional risk value: *This value is the mean of the degree of regional contactability (χ^2). Thus this can be simply expressed with the following formula.*

$$\text{Average risk value of region } i = \frac{\Sigma (\chi^2)_i}{N}$$

where,

$\Sigma(\chi^2)_i$ = *summation of the degree of contactability* (χ^2) *of all nodes in region i;*

N = *total nodes of the region i*

Regional Lag-times: *Meaning the average lag-times of all nodes of a region (cf. spatio-temporal contact probability field).*

Inter-regional Linking Node: *These links may have also been determined according to the hierarchic position of a node assigned in the original MRF. Thus M (with 3rd position in the hierarchic order) of the region 1 links with both the nodes of F and H (both with 4th position) of the region 2.*

Inter-regional Hierarchic Wave of STD/AIDS Diffusion: *meaning the path in which an infection wave spills out from one region to others. It may be logically concluded that STD/AIDS should have been transmitted from a region at high risk to the regions with lower risk values. Thus STD/AIDS may moves from the region 1 (with risk value of .74) towards the region 2 (risk value of 0.73), then towards the region 3 (risk value of 0.72). But region 4 can not be infected since it remains isolated and no direct linkage exists with other regions or with any node as well. However, It may be infected through links of hidden sex-spaces.*

Intra-region Diffusion Path: *meaning the paths by which diffusion of STD/AIDS likely to proceed on within a region. The paths are determined as per the hierarchic order of nodes in a specific region. Group 1, for example, has 6 members such as **L** (with 2nd position in the hierarchic order), **M** (3rd position), **E** (4th position), **B** (5th position) **G** (6th position), and **K** (7th position). Thus it may be expected that diffusion wave will follow these relative position of each node within the region.*

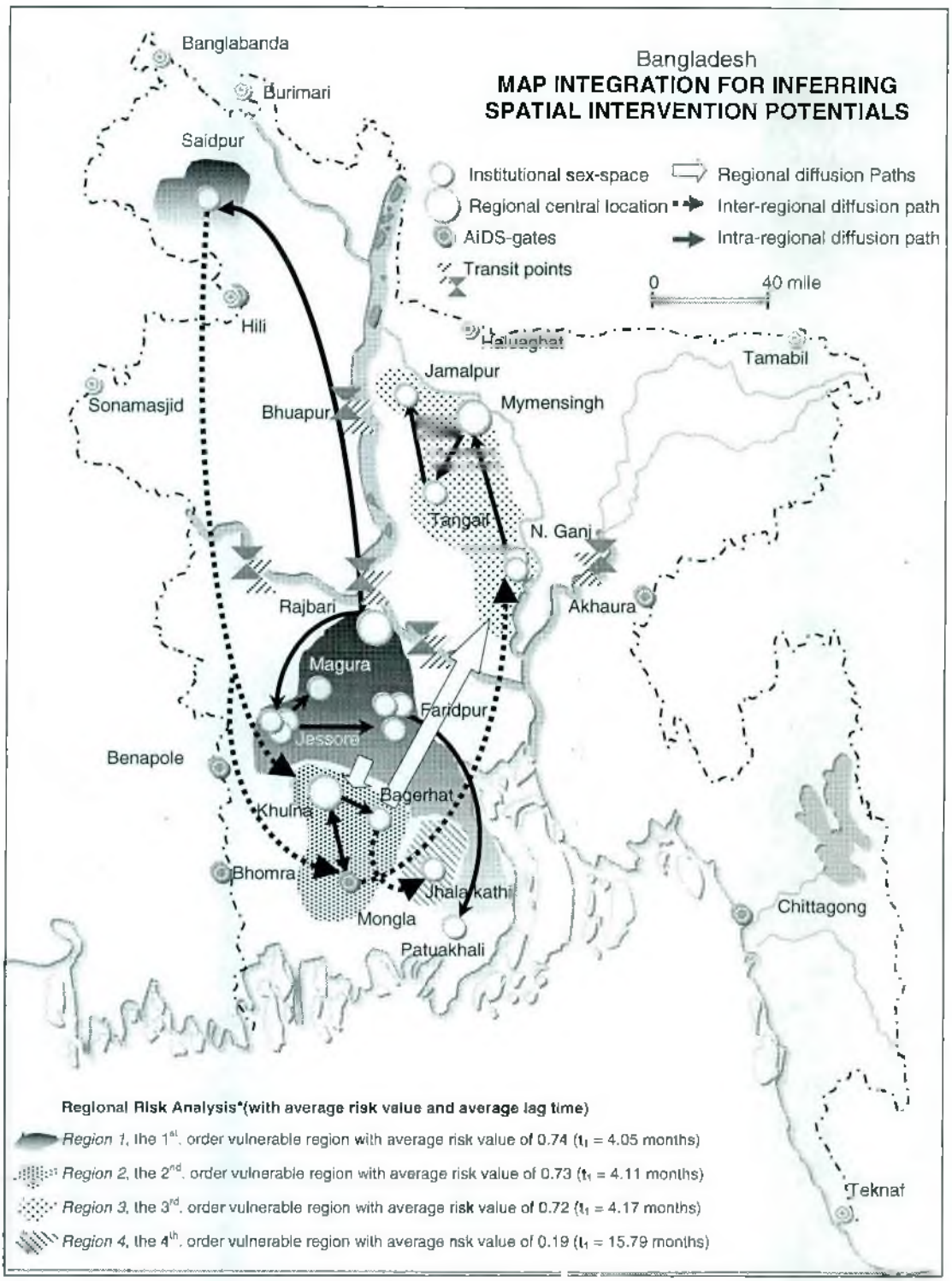


Figure 5.18 *Integration of areal algorithm for risk regionalization, prediction of both intra and inter-regional diffusion paths and also of regional average lag-times of being infected with STD/AIDS. This integration may utilize to determine the potentials of spatial strategy for network intervention for STD/AIDS and to determining the follow-up system through spatial order of contactability and predicted diffusion paths of STD/AIDS*

The integrated map shows four different vulnerable regions with different regional average risk values and lag-times and also shows the intra-regional (normal line) and inter-regional (stippled line) paths of STD/AIDS diffusion flow as well as the regional pattern of diffusion wave as a whole (block arrows). There are four regions with distinct center of each except region 4 (Table 5.20 and Figure 5.18). Moreover, two more information has also been added within the map. These are spatial distribution of truckers' transits and AIDS gates. . The figure however reveals that the phenomena of the vulnerability to STD/AIDS forms distinct spatial pattern with different regions and hierarchic orders. Therefore, this whole picture in turn makes the fact that STD/AIDS prevention should be organized from regional point of view and in different spatial orders. The spatial organization of intervention thus may be suggested into the following spatial orders.

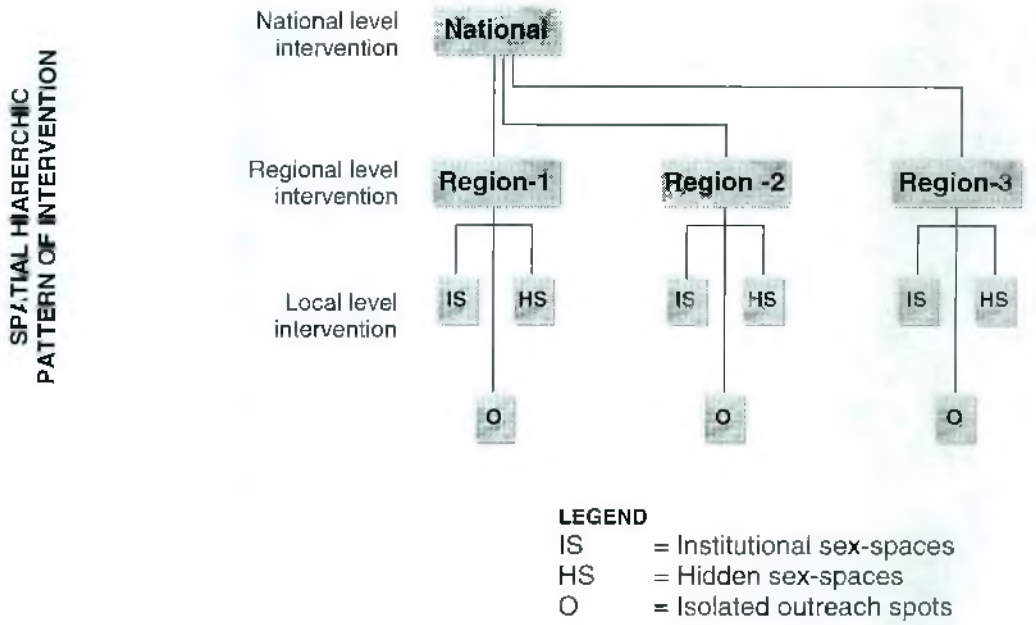
- **1st order intervention,** refers to the national level, which characterized by the core or head of all level interventions. The Figure 5.18 as well as the Table 5.20 shows that only Rajbari has the highest value of all issues regarding STD/AIDS, hence should be in the core of interventions. But for practical regions, national level of intervention rather should be at Dhaka, the capital and the ultimate destination of all national interests. This level of intervention should be incorporated with national truck terminal. Finally, this level should develop such way so that all other regional centers could be monitored.
- **2nd order intervention:** should be centered at cores of each region, such as at Rajbari of Region 1; at Khulna of Region 2; and at Mymensingh of Region 3. These centers will directly be linked with the national level as well as local level interventions.
- **3rd order intervention:** This order may be termed as local level. There are two characteristic channels in the level, such as institutional sex-spaces, and hidden

hex-spaces. Then for this level two sub-orders may be recommended. Even the characteristics of these sex-spaces should keep in mind in designing interventions. Since the institutional sex-spaces are located in identifiable places, the center-based intervention should be thought about. While the hidden sex-spaces, outreaches interventions are seem to be more appropriate.

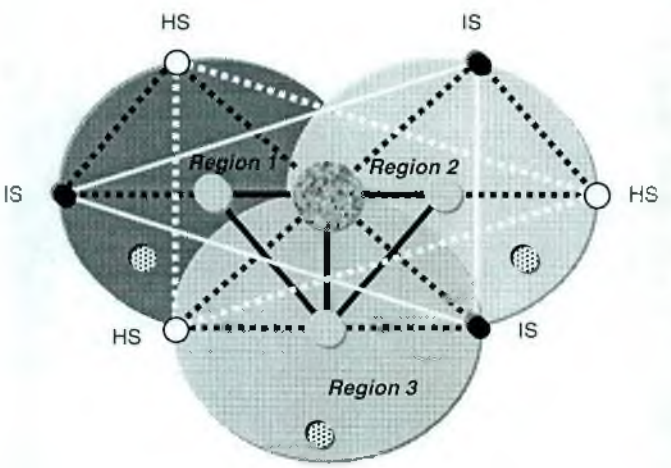
Furthermore, some isolated form of intervention can also be taken for those special locations where truckers' stopovers, transits, route edges, or AIDS gates *etc.* are encountered. These locations are mostly recorded as hidden sex-spaces. Figure 5.18 shows some of the identifiable locations for such interventions. This includes the truckers' transits and AIDS gates. Successful check at transit point may dramatically change sexual net pattern of truckers and check at AIDS gate is very important to halt the epidemic entering into the country.

This isolated form of interventions may also be suggested for the institutional sex-spaces or vulnerable region in which very insignificant sexual connectivity with other nodes is prevailing. Jhalakathi is an example of such node and region as well. Here some form of isolated and outreach based intervention seems to be enough for checking the epidemic in the region.

Finally, the hierarchic order of this proposed spatial intervention may be illustrated graphically, which presented in the flowing figure. The upper part of the Figure 5.19 shows the top to bottom intervention levels and their hierarchic orders in details. Though there are three intervention levels *viz.* national, regional and local level of interventions, but virtually four orders in practice, since the local level splits into two distinct orders *i.e.* net form and isolated form (Figure 5.19). The lower part of the figure shows the order of complex spatial linkages. This spatial order can also utilized in developing the monitoring and flow-up system, the final query of the present thesis, which is discussed in the next section.



SPATIAL ORDER OF NETWORKSAND FOLLOW-UP SYSTEM



LEGEND

- National level: national center
- Regional level: regional center
- Local level: at institutional sex-spaces
- Local level: Outreaches for hidden sex-spaces
- Isolated outreaches spots

- 1st order network
- 2nd order network
- 3rd order network
- 4th order network

Figure 5. 19 *The upper part of the figure shows the spatial hierarchy of interventions; the lower part shows the different level of interventions with complex and ordered spatial linkages between them in regional settings, and these order may used in developing follow-up system.*

5.7.2 Spatial Dimension of Follow-up and Monitoring System

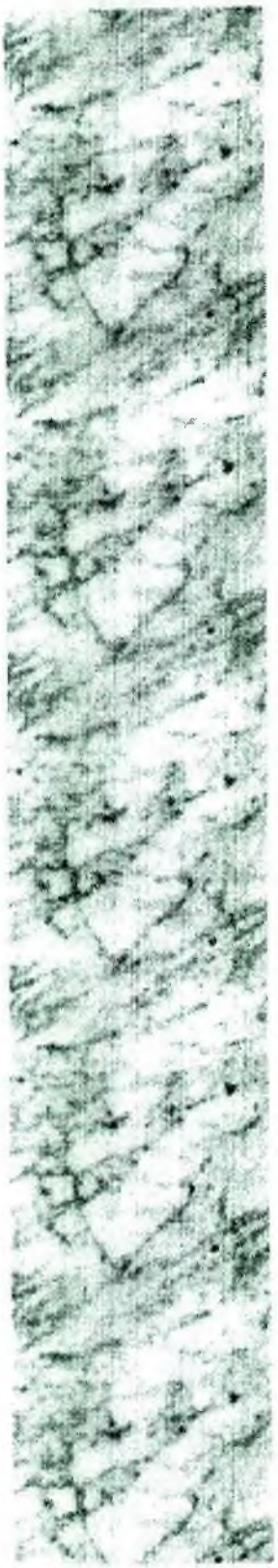
The spatial hierarchic strategy for intervention can also put to use in developing flow-up system for the programs especially designed for the mobile community like truckers. In any intervention program ensuring follow-up or monitory mechanism for evaluation of success is a vital component. Without having this component a project, whatever its glamour, can not be performed as good as expected and also can not be tested as well. "Monitoring" is the periodic oversight of the implementation of an activity which seeks to established the extent to which input deliveries, work schedules, other required actions and targeted outputs are proceeding according to plan, so that timely action can be taken to correct deficiencies detected. "Monitoring" is also useful for the systematic checking on a condition or a set of conditions, such as following the STD situation of truckers (OECD, 1988; UNICEF, 1991). Similarly, the term 'Follow-up System' usually refers in the rim of action programs to that mechanism by which the program target could be checked in chain referral process. In a program of STD/AIDS intervention, for example, a person is given behavioral counseling or medicine and then he advised to come again or referred to some one for rechecking or the patient is searched for rechecking. This process is termed as follow-up mechanism. To implement such a system among a community staying in a certain location may easier, but nearly impossible among the highly mobile community like truckers without following especial strategy with acceptable measures and tools.

In an innovative way CARE, Bangladesh, an NGO, ensures appropriate follow-up system among CSWs in a demonstration project named 'SHAKTI Project" in Tangail. They adopt an innovative approach in follow-up and monitoring system, which they termed as "Outreaches". With the view of CSWs' lack of conscious about STD/AIDS and as they burden with social embargo to visit outside their red light

area, CARE implemented the idea to follow-up through regular visitation of the clients' hat, which they called outreach strategy (the present researcher attended in a training workshop on the SHAKTI Project of CARE and also visited their project at Tangail). This strategy is no doubt useful for the people hard-to-reach, but strongly doubtful for the mobile community like truckers. One example can be cited here for comprehension of the fact as to why outreach strategy has little to at all no use in the STD/AIDS prevention program for truckers. A trucker, for example, is treated say, at a STD clinic in Aricha, where he had stopover for a few days, and he is needed to be rechecked after a week. This man is nearly impossible to reach. The very trucker himself does not precisely know where will be his next stopover, let alone the interferers or program activators. Then what is the use of outreaches, if no certain location is known? The very nature of the trucking profession makes the people and their venue to be hardest to reach. Thus conventional methods to innovative CARE's outreach operation has indeed no *cent per cent* use in developing effective follow-up system for truckers.

Under the critical scenario, spatial policy and strategy may be suggested. The spatial hierarchic development of interventions as suggested earlier may covers and integrates potential vulnerable locations, where infected or vulnerable truckers are expected to be available. Such of strategy will create a spatial network of intervention and each potential node within the network according to their magnitude of problem and will integrate the whole country under chain referral pyramid system. Thus the strategy can be attributed as 'spatial pyramidal hierarchic chain referral follow-up system' especially for the highly mobile community like truckers.

Chapter 6
CONCLUSION



6.1 Introduction

The final chapter is designed to bring to an end of the whole thesis into several summary findings so that on the basis of the findings some specific policy recommendations as well as spatial strategies for STD/AIDS intervention and other implications can be put forward. Besides, keeping the drawbacks and limitations of the present research, some points on further research direction are also suggested at the end of the chapter.

6.2 Conclusion and Summery Findings

The epidemic of AIDS has already exposed as the most vulnerable crux for whole mankind, though it has not yet been breaking out on a deadly scale in many parts of the world like Bangladesh. Nevertheless, threatening of AIDS remains unchanged in these areas. Therefore, the phrase 'vulnerable to AIDS' has become a public issue, which commonly refers to several high-risk behaviors. One of such crucial is the heterosexuality prevailing in particular community by which AIDS, other simple STDs, even many infections, and communicable diseases may be diffused within the whole society especially in a conservative society like Bangladesh. On the other hand, no successful treatment or even vaccination system for STD/AIDS has yet been formulated and therefore prevention is the only way to escape one from the danger of STD/AIDS. In case of prevention of STD/AIDS, the spatial aspects of sexuality *i.e.* origin of STD/AIDS, vulnerable area, spatial process of diffusion, locational and environmental determinant of the vulnerability *etc.* are important to know for determining effective locations and systematic spatial arrangement of prevention activities. But due to lack of systematic geographical research no spatially integrated and hierarchical arrangement of STD/AIDS intervention has yet been organized. However, the present research is an endeavor to meet the crying need.

The study necessarily consists of three issues namely spatiality, vulnerability to STD/AIDS, and the truckers. The first one is of geographical and the next one is of epidemiological. These two were fitted into each other's dimensions; in other words, the present thesis is concerned with the epidemiological concepts of vulnerability to STD/AIDS but from geographical approaches and tastes. For example, epidemiological concepts of heterosexuality, sexual networks, sociometric risk networks *etc.* were converted into geographical frame such as sex-spaces, spatiometric risk networks *etc.* The third issue as well as the ultimate focus of the present research was the truckers, the study population, on whom the first two *i.e.* epidemiological and geographical issues were applied. The study population truckers were considered from the fact that they were of geographically the most mobile population sub-group as well as of epidemiologically the high-risk group or core-group. Even they were huge in number; they were the only group whose had access to each corner of the country; and as several studies found to have unsafe sexual behaviors and practices among truckers. Moreover, they were rather closer connected to the general people and have bridging role between general people and the CSWs. Hence the community is not only vulnerable to HIV/AIDS, but through the group, HIV/AIDS can also be outburst amongst the general people as like as they are transporting goods over the country. Therefore, the study had been designed to understand the spatio-temporal aspects of sexuality and consequently STDs along with the risk for HIV/AIDS among the truckers community in Bangladesh in relation to their usual livelihood *i.e.* socio-economic and demographic characteristics, life style, sex behaviors, practices, knowledge, beliefs, values, as well as mobility behaviors *etc.* The study subsequently continued on towards critical analyses, prediction and simulation of the origin of STDs and its spatial diffusion process, locational vulnerability to STD/AIDS through trucker community, *i.e.* their sex-spaces, its

geographical locations and spatial pattern, linkage between the sex-spaces, spatiometric risk networks among truckers, locations vulnerable to STD/AIDS and its geographical and environmental determinants *etc.* However, the research starts with the the specific questions regarding the vulnerability to STD/AIDS from geographical point of view such as what are the specific locations from where STD/AIDS may have been originated and diffused over the whole country *i.e.* active origin, and is there any passive locations that are vulnerable to STD/AIDS; how and why a location becomes vulnerable to STD/AIDS or in other words what are the locational dynamic and environmental determinants that make specific location vulnerable; what might be spatial process of STD/AIDS diffusion, *i.e.* in which routes STD/AIDS may have transported over the country through the trucker community; is there any mobility behaviors that may make a person or a group at risk; how a follow-up system can be introduced and incorporated with the STD/AIDS interventions for truckers? These question are much more tendered to practical or interventions need than of problematic or academic nature of investigations. For these reasons the above issues were not lenient to attend with conventional methods of study. Therefore, a philosophical reviewing was done to have a methodological basis for meeting the above questions.

The very nature of the research persuades to follow a critical methodology, which derived from the philosophy of 'inter-looking system' where a systematic co-ordination has been done between inductive vs. deductive, qualitative vs. quantitative, and academic vs. practical approaches. Keeping these in mind the research planning was designed in both the 'inductive-descriptive' and 'deductive-analytical' logical way of learning. Thus the study started with a reconnaissance including organizational and qualitative survey. This is absolutely an inductive and descriptive method. Then with the learning of the *a priori* study, several operational

terms and concepts, necessary theoretical or conceptual frames were searched at the literature reviewing stage so that spatial analysis of the vulnerability to STD/AIDS could be performed. It was seen that the theoretical concepts like graph theoretic algebraic technique or network analysis, concept of spatial mobility were found to be well fitted in this concern and these concepts were successfully used as a structural model for analysing the vulnerability to STD/AIDS both from epidemiological as well as spatial point of view. In epidemiology, network analysis is an emerging field that helps to explain human immune deficiency virus (HIV) infection; HIV related risk behaviors and the spread of other infectious diseases. The concept can also be used for spatial networking and interactions. While the geographical concept of population mobility was also found to be put into useful for analysing the networks. Thus these concepts were used in abridging epidemiological and geographical concepts into a single chore and several new concepts and terms such as sex-space, spatiometric risk networking, trucking pattern, STD-core *etc.* were derived. Similarly, the study assumptions were derived; conceptual frame was formed; questionnaire was designed; the sampling procedure and data analysis techniques were determined. Finally, for questionnaire survey, a total of 240 samples of long-distance truck driver were interviewed at 4 selected sites *viz.* Tejgaon, Aricha, Benapole and Hili located on two nationally important truck routes in the country. However, the study findings have been summarized on the following pages as the conclusion of the present treatise.

On Truckers and Trucking Industry

- Estimated that there were about 40,000 trucks playing on road in the country. This figure was somewhat different than those of government statistics.
- The fields, with which trucking is concerned, are defined as 'Trucking Space'. These include truck terminals, stands, stoppages and parking lots. There were

two small truck terminals and approximately 130 truck stands were estimated in the country. Besides, there were stopovers and parking lots. These were numerous in numbers and may grow up anywhere and at any time.

- Similarly, the places, at where trucks were registered *i.e.* the original node (O), were defined as 'Truck-base' and six of such bases were identified *viz.* Dhaka, Chittagong, Khulna, Rajshahi, Bogra, Rangpur *etc.*
- The trajectory, on which trucks were moving, was defined as 'Trucking Route'. A total of six Dhaka-based and nationally important routes were. Of the routes, some of the destinations were more important. These were Khulna, Mongla, Jessore, Benapole, Chittagong, Rajshahi, Bogra, Rangpur, Dinajpur, Hill, Banglabanda *etc.* These were either sea or land ports or divisional or district headquarters of the country.
- The intermediary locations on particular routes in which truckers have to halt for physical cause such as presence of river on the route were termed as 'Trucking Transits'. In other words, these are ferry *ghats.* The very ecological characteristics of a transit point such as traffic jam, long serial, lack or absence of means of time passing and resting may create irritation on truckers' mind. This consequently may lead them to irregularities like taking alcohol or having sex for recreation and passing time. Aricha is recorded as the ever-largest transit in the country followed by Bhairab, Saidpur *etc.* These transit locations have become worsen in the winter.
- The ending or termination points on particular truck route, characterised by land ports, seaports, or important border-crossings were named as 'Trucking Edges'. A total of 13 trucker edges was identified, except two seaports, all were either land ports or important border crossings. Benapole is the ever-largest land port in the country. These ports of entry may play as the role of 'AIDS gate' for Bangladesh.

- There were two seasons in the trucking industry *viz.* '*Kamer Moushum*' (peak season) and '*Mora Moushum*' (dull season). Peak season starts in the Bengali month of *Kartik* (mid of October) and lasted unto the month of *Jaysthya* (mid of May). While dull starts *Jaysthya* and continues unto *Kartik*. Country's total truck flow declines around 25 *per cent* in the dull season.
- Apparently, there are two types of trip in general_ local, and inter-district. Trips consumed less than a one day were called local and the rest were labelled as inter-districts. Estimated that at least 30 *per cent* of the total truck trips in the country were of inter-district typed and the overwhelming rest were of local or regional trips.
- A substantial number of people were directly or indirectly associated with the trucking industry. However, truck driver and helper were in the core compare to others. They were directly involved in trucking goods and have to move with the truck. Thus these two groups were designated as 'Truckers'. Besides, there were other groups including those usually play pressure role on truckers are termed 'Pressure Group' *e.g.* owner; and opposites were termed 'Peer Group', *e.g.* sex workers.
- There were two nation-wide truckers' unions and each had nearly 200 branches and both had a total of 50,000 registered members around the country. These two unions disunite the truckers into two vying groups. Both were found to be playing least role for community interests rather appeared to be more exploiting and political in nature.
- Estimated that there were about 80,000 truck drivers and 50,000 helpers against 40,000 of trucks playing on road in Bangladesh. Of the drivers, nearly 30 *per cent* *i.e.* 24,000 were estimated as long-distance drivers.

On Socio-economic Characteristics

- Apparently trucking is an irrefutable job. Certain age-range, enough training and experiences were needed especially to be an inter-district driver. In usual cases, a fresh young aged 15 to 20 years started as helper or assistant to the driver. The driver as *Ostad*, is responsible to train his assistant or helper, the *Sarged*. After completion of continuous 6 months to 2 years training period, one becomes a driver. Then he has to apply for ordinary driving license, next for HTV license and subsequently he turns to be a matured driver. This process seizes frequently up to 10 years. Thus truck drivers, especially those are playing inter-district trips, were found to be of certain age group. The data showed that the overwhelming majority of respondents were of 30-50 years age level. More than 90% of the sample truck drivers were married. None of the truckers were reported to be female. Except one case, all the respondents were Muslim. Nearly all were migrated from rural areas, especially from various parts of the old grater districts of Barisal, Noakhali, and Comilla.
- Drivers' are usually employed on trip-contact basis and hence a few drivers can work round the year. On average they had 6-8 months works in a year. However, drivers' earnings in contrast to Bangladesh are by no means indigent. In total, an earnings of TK. 8,000-15,000 in a month was common among the inter-district drivers. This amount is parallel to those of upper-middle to even near to the lower-upper income group in Dhaka. But it does not suggest that the truckers are fall into the high-income group. Rather, sociologically they may be categorised as the lower to hardly middle-middle social class. Their living standard, expenditure pattern, and overall social characteristics *etc.* emphasised this fact. Though more than 90 *per cent* were literate, but a very few studied up to the grade of S.S.C. Even though their housing quality was not as worse as slums and squatters but not as so as

expected. The amount of total expenses and pattern of expenditure deemed to be high and peculiar. Savings were utilised during the days of the off-season and eventually savings come down to nothing at the end of year, even they very often depend on loan from other fellow drivers for survival. Nevertheless, it was also evident that a good number of the drivers had become owner and rich-man through trucking profession.

- They do not have enough sources of recreation. They pass their time simply by gossiping, listening song, playing cards *etc.* A good number of respondents considered of taking alcohol or going to women for commercial sex as recreation.

On KABP and High Risk Behaviors

- The respondents were quite familiar with sexually transmitted diseases as they often suffered from it. But surprisingly no one indicated AIDS as a sexual disease. Even only a few respondent truck drivers ever heard AIDS with various misconceptions. No one had found to be correctly aware of the nature and mode of transmission and preventive measures of AIDS, even as to the preventive measures of other common STDs as well.
- A sense of social and cultural alienation and apathy was found to be prevailing among the whole community in general. They all were more or less worried about their distorted social image as 'killer', which gave rise to job dissatisfaction and irregularities in lifestyle. Although they were quite aware of the danger of visiting brothel, but their attitude seemed to be somewhat fatalistic and little care about whether the CSWs were passing any disease to them.
- All the respondents were apparently sexually oriented, both pre- and extra-marital sex and other forms of heterosexuality were found to be prevailing among

the community in general. Most of them lost their chastity and sexual virtuous after entering into the trucking. Nearly 70 *per cent* of the respondents had sex with multiple partners during last three months and in most cases the number of partners was corresponding to the number of institutional sex-spaces *e.g.* brothels. On average they had 5 sexual links during this time. But the total number of lifetime was not as high as thought to be. The underling reason was the fixed-up channel of sex networks. However, the range of number of partners varies in accordance to the range of experiences in trucking.

- None of them used to practice safer sex with condom. The attitude towards condom was very negative. For the purpose to protect themselves from STDs, the number of users was very low, only one-tenth of the total and did not use in each sexual contact, even they did not know how to use condom correctly.
- The most phenomenal sign of trucker community was the addiction of various substances. The alcoholism found to be at large practice among them. Some type of local wine, known as *Bangla,* was very popular among the truckers. But the general reaction in the community towards drug addiction was negative and none was found to be habituated in intravenous drugs and sharing needle,
- None of the respondent was found to use individual razor regularly for shaving purpose. Even they were not cognizant about risk of such practice.
- All the above were established as direct factors of being contaminated with simple STD like skin disease to AIDS. Even the peripheral factors like using common saloon/razor was also preponderant among them. Their knowledge, attitude and beliefs regarding safety health and care of life were found almost far from truth. Thus the truckers may have been labeled as one of the 'Core or High Risk Group' and consequently vulnerable to STDs as well as HIV/AIDS.

On Mobility or Trucking Behaviors

- Truckers had to away from their family for a few days to over a half-year of time period, even sometimes they were forced to continue working months after months especially in the peak seasons, which was found to be one of the most important reasons of visiting sex-workers. They visited to sex workers not only for having sex but also to have closer touch that they fail to have from own family due to their job nature.
- Found that nearly 30 single-way long distance trips (either up or down trips) were recorded to be performed by the respondents during the last three months before the time of interviewing. Most of the long distant trips captured huge times and most of them had to on road for about 50 to nearly 80 days. This picture clearly makes the fact that how much travelling irritation with the long distant truck drivers.
- An uncertain job hour characterised by long hours non-stop driving was also another striking feature in trucking profession, particularly true for those engaged in inter-district driving. Found that though 3-6 hours non-stop driving was common in inter-district trips, but sometimes it raised even 10 hours. Note that long non-stop driving hours was one of the causes of frequent road accidents as perceived by the respondents.
- Found that Dhaka-North routes (Dhaka-Rajshahi and Dhaka-Rangpur) were perceived as the most time-taking routes, though the physical distance was not as high as others were. The intervening times made the truckers irritate and inspired them to have sex with CSWs or other vulnerable behaviors.
- Also found that Dhaka-Chittagong route was perceived as the most troublesome route followed by Dhaka-South, Dhaka-Mymensingh, Dhaka-North. Robbery / theft, and traffic jam and especially police harassment were the commonest annoyances

on the highways of the country and the magnitude of these problems may somewhat be changed on different routes for some whiles but the phenomenon of police harassment remains constant all over the country.

- Found that other than physical causes, there were self-decided stopovers where truckers had to stay for resting on the long way of a trip. These were plenty in numbers and subject to personal interest. Usually these places were residential hotels or boarding houses, brothels, shops, garages, union or transport agency offices, slum areas, or some resting places with or without having dwelling facilities. These stopovers or resting-places were the most vulnerable compare to other trucker-places, as observed that most of sexual acts and other risk practices among the truckers had been taking place in theses locations.
- Finally, as for cross-sectional properties of the background, no momentous differences in risk behaviors were seen among the studied population, since the present study was concerned with such a population, who were mostly homogeneous in socio-economic background. Similarly, no significant pattern was found in trucking behaviors of the respondents in relation to their socio-economic characteristics. But a distinct relationship was seen between mobility and sexual networks.

On Sex-spaces and Spatiometric Risk Networking

- Found that people who were heterosexuals, were mostly sex buyers and thus for buying sex one might visited either brothel or may find street or hotel-based floating sex workers. The locations of these different types of sex workers are not alike, but both retain spatial identity, then the phenomenon of sexuality is also fitted for geographical-spatial analysis. Truckers' sexuality essentially located in certain spaces, which termed as sex-spaces. Truckers' sexuality and other risk

behaviors were mostly found in certain locations of the major truck routes *viz.* stopovers, transit points, ending ports or truck edges, and starting stand (O) *etc.* Sine these places were characterized by sexual activity and other risk behaviors, then were identified as vulnerable locations.

- A total of 15 distinct places were identified where the respondents had heterosexual sex experiences. The respondents were able to rank sex places only in two orders *viz.* different established brothels in the country as the first order termed as 'institutional sex-spaces'. While, for the second order, several places were identified, which were mostly characterized by the concentration of floating sex workers. These group of sex worker is neither socially recognized nor their business is permitted by the legal authority. Hence these so-called 'fallen' group and their works always tend to be located in the something mystic, underground or hidden places with peculiar timing, therefore termed as 'Hidden sex-spaces'.
- Found that major concentrations of hidden-spaces were ubiquitous in general and in particular were seen at busy places like stations, ports, *ghats* or public places like parks, recreation spots *etc.* in major metropolitan cities, district headquarters, or along the highways or traffic routes of the country. Dhaka-Chittagong, Dhaka-North and Dhaka-Sylhet routes were exposed to have more floating sex and the city of Dhaka, Chittagong, Rajshahi, Sylhet, Barisal, Kustia *etc.* were shown as the most prone to hidden sex-spaces in the country.
- As for temporality, sex-spaces of truckers customarily inaugurated after sun set and outlasted up to the death of night, but evaporated at the daylight. This episode was especially true for the places used for having sex with the absolute floating CSWs, *e.g.* street girls.

- Hidden sex-spaces were informal in nature and more changeable, while institutional sex-spaces are formal and authorized, then these spaces are more static and easily identifiable.
- Unplanned eviction of formal sex-spaces *i.e.* brothel may have been resulted hidden sex-spaces and this is why hidden-spaces are found to be prevailing in that locations where brothels were being forcedly driven out.
- Estimated a total of 34 established brothels in the country, of which 15 had already been evicted by the local community between last two to ten years, and the number of brothel-based CSWs was estimated around 40,000 and all were not registered. However, considering the others including floating ones the figure would be much higher than a hundred thousand.
- Most of the active sex institutions were located on the Dhaka-South route particularly in Faridpur, Jessore and Khulna districts
- Daulatdia not only places in the core of the country's geographical limits, but also maintains functional and strategic position in the transport networking system in Bangladesh. This makes the location overwhelming vulnerable to STD/AIDS.
- Locational distribution of sex-spaces formed a spatial pattern following the Padma, Meghna and Jamuna river and also on the major truck routes namely Dhaka South, Dhaka-North, Dhaka-Mymensingh, Dhaka-Chittagong and Dhaka-Sylhet. The spatial pattern was qualitatively categorized into three distinct regions, which was termed as 'Sex Region'. The first region covers the whole southern and southwestern districts of Bangladesh; the second one covers the northwestern districts and third one includes the routes of Dhaka-Chittagong, Dhaka-Mymensingh, Dhaka-Sylhet and covers the rest parts of the country *i.e.* the whole northeast and the southeast districts of Bangladesh.

- Institutional sex-spaces were considered according to their locational identity, *i.e.* origin district. Thus the total of 19 countrywide active brothels was grouped into 14 sex-spaces.
- Observed number of links between all institutional sex-spaces was 42 and average degree of connectivity between all institutional sex-spaces was 0.52.
- Observed that total frequency of links between all sex-spaces = 1180; total frequency of links between all hidden sex-spaces = 260; total frequency of links between all institutional sex-spaces = 766; total frequency of links between all institutional and hidden sex-spaces =154. Thus the average links between all sex-spaces during last three month = 78.67.
- Found that Node L (Rajbari) was the most central and accessible and Node N (Jhalakathi) was found to be the least accessible as well as peripheral among the institutional sex-spaces in the country,
- The areal algorithm for functional regionalizing indicated a total of four vulnerable regions in which three groups had reflexive pairs and associated with other members, but the rest, Group 4 was completely dismembered and formed an isolated vulnerable region.
- Notice that functional coherence within the regions and between regions clearly indicates the spatially integration of functional sex-regions, which apparently may leads one towards think about the probability of spatial diffusion of sexually transmitted diseases and also about the potentials of spatial strategy for STD/AIDS interventions.
- Found that like as formal regions areal groupings of sexual networking *i.e.* the functional regions were also located almost in the same geographical tracts.

On Simulation of Spatial Diffusion

- Found that truckers' sexual contacts between different brothels were not inversely proportional to actual geographic distance, rather were directly related to the trip pattern and frequency or in other words proportional to imploded location.
- Following the basic principles of Hägerstrand's model, the concept of 'Mean Risk Field' or MRF was developed meaning an area, or field, in which sexual contact could occur and hence chance of STD/AIDS infection.
- Because of trip pattern, expansion type of spatial diffusion is not possible; rather hierarchic order in sexual networking was an important predictor for spatial diffusion of STD/AIDS.
- Determined that if AIDS had appeared in Bangladesh, it would follow the path of probability of risk in each cell of the MRF. Thus wherever AIDS had virus appeared in Bangladesh, according to the way mentioned in the MRF, it would first jump over Rajbari, since the location possess highest probability (p=1.3) Antithetically, the chance of reaching of AIDS virus in Jhalakathi was lowest with nearly just 20 *per cent* only.
- Implied that if a member of a reflexive pair had become infected, the other member of the pair, even though with different probability value, had equal chance to be infected at the same time.
- The spatial-temporal dynamic pattern of diffusion of STD indicated that if AIDS had entered into Bangladesh, and if the truckers had become vector, it would certainly be carried to Rajbari first and within a period of 2.55 months and would transported to others sex-spaces within the times needed according to their risk probability.

- The concept of infectability (the rate of chance of infection) have been developed to assess the potential production rate of STD/AIDS of different sex-spaces in Bangladesh and had seen that Rajbari had the highest infectability and the location had the potentiality to produce nearly 15-times more HIV positive cases than of Bagerhat and about 45-times than of Jhalakathi.
- Estimated prevalence and incidence of STD among the respondents for the last three months was 5.42 and 7.78 respectively, while the lifetime prevalence of STD among the respondents was estimated as 63 *per cent*.

On Geography of STD-cores

- Revealed that though independently institutional sex-spaces were perceived by the respondents to be the most suspected origin of STD, but different hidden sex-spaces jointly generated rather more STDs among the truckers
- It was also apparent that hotel-girls were less prone to STD (22.61%) than the absolute floating CSWs *i.e.* street gay girls (29.15%).
- Medium class hotels and brothels were two common sources for the case of truckers in acquiring of STD, and none of the respondents reported to have STD from sources like fiancées or other household sources.
- Of the institutional STD-cores, Narayanganj and Rajbari put on the top of the list; and Dhaka-Chittagong route was identified as the route most prone hidden STD-core.
- Perceived that remoteness, size and quality of institutional sex-spaces and other hidden sex-spaces, having lack of treatment facility and other interventions, poverty of sex-workers *etc.* along with sexual networking were shown to be the noticeable factors in making a location STD-core.

- Established that spatiometric risk networking of trucker community shaped the risk field and specific locations on it vulnerable to STD/AIDS.
- Scatter diagram ascertained that 40 *per cent* high correlation exist between the sexual networking and STD-core.
- Coefficient of correlation indicated that 0.37 of the variation of STD-cores was explained by the sexual networks. The value was a little bit less than the critical value (2.66). Thus the assumption (H_0), *i.e.* the degree of sexual networking and the degree of STD-core might be accepted with conditions.
- Seen that hidden STD-cores were more related with the sexual networking. Even both the rates of sexual activities and the incidences of STDs in hidden sex-spaces were found to be higher.

On Geographical Determinants of the Vulnerability

- Found that risk behaviors of the truckers were space oriented and highly related to their mobile life. Both the risk behaviors of heterosexuality and alcoholism were found on different scale among large number of cases at different stopovers on the highways.
- 'Spatio-psychometric analysis revealed that four elements *viz.* having concentration of sex workers (spatial), having money (economic), having potency (biological), and having time temporal) *etc.* were the basic in making the mentality of respondents to visit sex workers in particular locations. The analysis also showed that the whole decision-making process itself determined by several factors which included something within the locality where decision of performing risk behaviors was made as well as global factors laying beyond that location. There were as many as 26 identifiable factors were recognized.. However, the

factors were categorized as Professional, Social, Community & Personal, Economic, Chemical, Spatial, Ecological & Environmental, Psychological *etc.*

- The psychoanalytic explanations of trucker risk behaviors *viz.* abnormality, personality disorders, maladaptive behaviors, antisocial personality, stress and anxiety, phobia and other various concepts regarding psychological disorders were also found to be fitted in explaining the truckers risk behaviors in particular location. This is meaning that truckers' psychological matters were also related to spatial and environmental quality of particular locations. Especially some cases, truckers psychology of performing risk behaviors was directly related to particular location, such as agoraphobia or something unlike to agoraphobia that termed as 'location mania' meaning peculiar attraction and craze to certain places that impels to have sex or other risk behaviors.
- The analysis of 'tempo-psychometric analysis' revealed that winter was tending to more sexuality. Similarly more sexual occurrences were seen in the peak season and less in dull period in trucking industry.
- Apparently, there was a direct relationship between mobility and sexuality and also with climatic seasons, but not direct. The functional coherence of these three elements could be written as, climatic season → mobility → sexuality, meaning that sexuality is the function of mobility; and mobility is the function of climatic seasons. Therefore, climatic seasons were simply playing an intermediate role in controlling the occurrence of sexuality.
- The same analysis also showed that higher STD incidences were found in the rain, than that of winter. This was clearly contrasting to the trend of sexuality that found higher in the winter and lesser in rainy days. This peculiarity made the fact that there might be relationship between STD and humidity of rainy days.

- Revealed that morning time was completely avoided by all respondents for regular sexual practice. But both the times of evening and night were given higher preference for occasional practice of sex.
- Seen that though specific time sometimes provoked in raising personal emotion, feelings leading to sexuality, but no clear cut evidence was found about the deterministic quality of time factor in influencing sexuality or other risk behaviors.

On Planning of Spatial Network Interventions and follow-up System

- The map integration in turn made the fact that STD/AIDS prevention should be organized from regional point of view and in different spatial orders.
- This spatially ordered and hierarchic networking in STD/AIDS intervention could be utilized in developing the monitoring and flow-up system, which expected to be useful especially for the highly mobile community like truckers.

6.3 Implications and Policy Recommendations

For Development and Relocation of Truck Stands

- At present there are only two small government allotted truck terminals in the country and both are located in Dhaka City. These terminals were properly developed with the basic requirements for truckers' movement such as having parking places, rest room, union office, toilet and sanitation facilities *etc.* But there is no national truck terminal at all, though there is a joint terminal at Gabtali for both truck and bus. This policy should be reviewed. First, truck terminal should be relocated, as their nature is different; second, a national standard truck terminal should be established in Dhaka City. At least a large and regional standard terminal should be developed in each truck-bases such as Chittagong,

Khulna, Rajshahi, Rangpur, and Bogra as well as in each divisional headquarters and each core of functional sex regions. Truck stands around the country are not formally authorized. These stands should be recognized and should be properly developed. Unnecessary stands should be evicted. The Union officials opined that at least a stand should have in each district. Moreover, necessary stopovers with required facilities should be developed in each sea or land port, commercial or industrial important places, ferry *ghat* and other transit points.

- Relocation of all kind of truckers' places is urgent. The site for terminal, stand or stopover must be in the outer rim of the city, but near to industrial or wholesale areas or as per local needs.
- Each Stand should have the following facilities: union office set-up, water and sanitation, resting and recreation places, boarding and fooding, medicare, communication *e.g.* postal and phone services, counseling, legal advice, Training and education facilities.
- NGOs, as they have excess to grassroots level, may be employed in imparting such facilities and motivating the community.

For STD/AIDS Interventions

- Since the truckers are associated with other groups, then for any targeted intervention to reduce or prevent STD/AIDS among the truckers, people around the trucking industry including peer and pressure groups should be involved for achieving better return.
- Unplanned and random eviction of established brothels may create critical situation, then should not be incorporated or even not encouraged in the government policy and planning.

- Since it was evident that on the whole, trucker sexual behaviors are exposed to have an identifiable timing bias, therefore this trend may be used for determining the time schedule of intervention measures.
- Since the institutional sex-spaces are located in identifiable places, the center-based interventions are suggested. While for the hidden sex-spaces, outreach based interventions are seem to be more appropriate.
- The order of complex spatial linkages between different level of hierarchic interventions are suggested to utilized in developing the monitoring and follow-up system in the intervention cycle for the mobile community like truckers.
- Details of spatial policy recommendations have been given in the end section of Chapter 5; however, in which three levels of integrated and hierarchic interventions have been suggested namely national, regional and local level. Besides some isolated form of interventions have also been suggested for the vulnerable areas where truckers' stopovers, transits, route edges, or AIDS gates *etc.* are located. These were mostly recorded as hidden sex-spaces. Successful checking at these points may dramatically change sexual network pattern of truckers. Similarly, checking at AIDS gate is very important to halt the epidemic entering into the country.

Other Implications

Finally, studying spatiometric risk networks can help researchers to understand the spatial diffusion STD/AIDS infection through mobile community like truckers. It may also help policy maker and health planers in developing new ways to reduce transmission in high-prevalence areas and preventing epidemic outbreaks in low-prevalence areas. Such interventions are surely needed. In areas where high

sexual networks exist, intense and immediate intervention might spark rapid transmission. In low prevalence location network interventions to supplement existing programs might prevent many infections as well as further spatial expansion.

6.4 Scope of Further study

The present study was conducted along the two Dhaka-based major truck routes only. But there are other important routes that also need to be studied. Similarly, more studies on multi-centered trucking flow may be undertaken so that details and deeper understanding of truckers' mobility pattern could be consummated.

Recently Jamuna Bridge has been opened up for traffic movement and thus a new important route is being created, which undoubtedly changes existing truckers' mobility pattern and especially Aricha has already lost its importance. Eventually, truckers sex networks and consequently STD epicenters may have been reprogrammed. These should further know in details.

Moreover, a separate study covering the same objects should be conducted especially on truck helpers as they found to be different age and income group within the trucker community.

One of the analyses of the present research shows that highest cases of STD incidence are found in the rain, the dull season in the trucking industry. The incidence figure of the rain is not only the highest, but clearly double to that that of winter, the peak season in the trucking industry. This is extremely surprising and clearly contrasting to the established assumption that sexuality is basal factor of STD. In this case, though the occurrence of sexuality found to be higher in the winter and lesser in rainy days, but conversely the rate occurrence of STD is seen more in the rainy season and fewer in the winter. Even the trucking seasons, which

were directly determined by the mobility rate, had shown little variation in STD occurrence, although peak season was characterized by more STD incidences. This peculiarity makes the fact that there may be relationship between STD and humid climatic nature of rain days. This is may be of activating of STD virus in the rainy environment or may be of going down of the immune system of human body in the same season. However, this relationship can not fully be understood with socio-geographical approach, rather further studies are strongly recommended to be approached from bio-medical point of view.

Finally, some concluding remakes of the present thesis may be hypothesised for further empirical investigation and testing.

- The incidence or prevalence of STD cases among the trucker's in particular location is significantly associated with the frequency of having sex in different places.
- There is a significant relationship between long-distance trip (space context) and having sex in different sex-spaces as well as incidence of STD.
- There is a significant relationship between long-duration trip (time context) and having sex in different sex-spaces as well as incidence of STD.
- There is a significant relationship between frequent or regular trip (social context) and having sex in different sex-spaces as well as incidence of STD.
- The length of away from home/family is significantly associated frequency of having sex in different sex-spaces as well as incidence of STD.

Adler, M. W., 1996. "Sexually Transmitted Diseases Control in Developing Countries", *Genitourin-Med.*, 72(2): 83-8.

Ahmed, J. and Hawkes, S. 1997. " Knowledge, Attitudes, and Practices (KAP) Survey, among Commercial Sex Workers Residing in Taan Bazaar Brothel", special publication no. 57, Proceedings of the ASCON VI: Annul Scientific Conference, ICDDR, B, Dhaka, March, 1997.

Anderson, E. A., Forssman, L., and Milson, I., 1996. "The Relationship between Knowledge about Sexually Transmitted Diseases and Actual Sexual Behaviour in a Group of Teenage Girls", *Genitourin-Med.*, 72 (1): 32-6.

Aral, S. O., 1994. "Sexual Behaviour in Sexually Transmitted Disease Research: An Overview", *Sexual Transmitted Diseases*, 21 (2 Suppl.): S59-64.

Aral, S. O., 1996. "The Social Context of Syphilis Persistence in South-eastern United State", *Sexual Transmitted Diseases*, 23 (1): 9-15.

Archo, E., 1993. *Survey of Long Distances Truck Drivers*. Unpublished report, Dhaka: VHSS.

Auerbach, D. M., Darrow, W. W., Jaffe, H. W., and Curran, J. W., 1984. "Cluster of Cases of the Acquired Immune Deficiency Syndrome: Patients Linked by Sexual Contact", *American Journal of Medicine*, 76: 487-492.

Bauman, Z., 1978. *Hermeneutics and Social Science: Approaches to Understanding*, London: Hutchinson.

BBS, 1997. *Statistical Yearbook of Bangladesh*, 1996 (7th edition) Dhaka: Bangladesh Bureau of Statistics, Govt. of Bangladesh.

BBS, 1998. *Statistical Pocketbook of Bangladesh*, 1997, Dhaka: Bangladesh Bureau of Statistics, Govt. of Bangladesh.

Beck, E. J., Mendalia, S., Leonard, K., Griflith, R. J., Harris, J. R., and Miller, D. L., 1996. "Case-Control Study of Sexually Transmitted Diseases as Co-factors for HIV-1 Transmission", *International Journal of STD/AIDS*, 7 (1): 34-8.

Bell, R. 1988. *Changing Bodies, Changing Lives*, New York: Random House. Quoted from: J. E. Rodgers, *Drug and Sexual Behaviour*, the Encyclopædia of Psychoactive Drugs, series 2, New York: Chelsea House Publishers, 1988. p.23.

Bhatta, P., 1993. STDs *Treatment and Preventive Approaches: Rangunia*. Dhaka: Save the Children, USA.

Bhuiya, I. Hossain, S.M.I., and Streatfield, K., 1995. *Situation of Blood Testing/Screening in Relation to HIV/AIDS in Dhaka City*, Dhaka: Population Council.

Blaut, J., 1961. "Space and Process", *Professional Geography*, 15:1-7.

Bloem, M. A., and Karim, D. (eds.), 1996. "HIV/AIDS and Mobility, Bangladesh", Report of Workshop on HIV/AIDS and Mobility, Media, Legal and Ethical Issues and Behavioural Research, Dhaka: CCDB.

Brown Lawernce, A. B., 1968. *Diffusion Process and Location: A Conceptual Framework and Bibliography*, Bibliography Serious No. 4, Pennsylvania: Regional Science Institute.

Buga, G. A., Amoko, D. H., and Ncayiyana, D. G., 1996. "Sexual Behaviour, Contraceptive Practice and Reproductive Health Among School Adolescents in Rural Transkei", *South African Medical Journal*, 86(5):523-7.

Caram News, 1997. a newsletter of Caram-Asia: regional network of organisation of South and South East Asia with Vrije Universiteit of Amsterdam, the Netherlands, for action research on HIV/AIDS and Mobility in South and South East Asia, "News from Around the World", issue 1, June, 1997, p.10.

Care, Bangladesh, 1997. "Document of the Workshop on Designing Behaviour Change Intervention for HIV among High Risk Population in Bangladesh", a training document prepared for BAPC, Govt. of Bangladesh, p. 15.

CEDAR, 1995. *Population Assessment on Truck Drivers*, a narrative reports submitted to HASAB, Dhaka: Concern for Environmental Development and Research (CEDAR).

Chambers, R. 1992. *Rural Appraisal: Rapid, Relaxed and Participatory*, Brighton: Institute of Development Studies at the University of Sussex.

Check, W. A., 1988. *AIDS*, The Encyclopædia of Health series, New York: Chelsea House Publishers. p. 14.

Chorley, R. J., 1964. "Geography and Analogue Theory" *Annals of the Association of American Geographer* 54:127-137.

Chorley, R. J., and Haggett, P., 1974. *Network Analysis in Geography*, 2nd edition. London: Edward Arnold: N.Y.: St. Martin's Press.

Choudhury, M. R. 1998. "Socio-economic Impact of AIDS", paper presented at the seminar jointly organised by the UNAIDS and Foreign Chambers of Commerce and Industry, Dhaka, 12 November 1998.

Choudhury, M. R., Rahman, A. S. M., Moniruzzaman, M., 1989. "Serological Investigation for Detection of HIV Infection in Bangladesh", *Bangladesh Armed Force Medical Journal*, 13:1-9.

Choudhury, M. R., Siddique, A.K.S., Jesuthasan, E., 1992. *HIV/AIDS Prevention in Bangladesh*, Dhaka: National AIDS Committee (NAC).

Chowdhury, A.Q.M.B., Choudhury, M.R., 1994. *HIV/AIDS Prevention Strategies in Developing Country like Bangladesh*, Dhaka: National AIDS Committee (NAC).

Cohen, M. S., Henderson, G. E., Aiellop, P., and Zheng, H., 1996. "Successful Eradication of Sexually Transmitted Diseases in Peoples Republic of China: Implications for 21st Century". *Journal of Infectious Diseases*, 172 (suppl.2): S 223-9.

Curtis, R., Frieddman, S. R., Neaigus, A., Jose, B., Goldstein, M., and Ildefonos, G., 195. "Street-level Drug Markets: Network Structure and HIV Risk", *Social Networks*, 17: 229-249.

Darrow, W. W., 1997. "Health Education and Promotion for STD Prevention: Lessons for the Next Millennium". *Genitourin-Med.*, 73 (2): 88-94.

Dasgupta, S., Frieddman, S. R. and Jose, B., 1995. "Using Retrospective Behavioural Data to Determine HIV Risk Factors among the Street Recruited Drug Injectors", *Journal of Drug Issues*, 25: 161-171.

Davis, P. 1977. *Data Description and Presentation: Science in Geography*, Serious 3. Oxford: Oxford University Press.

Dickson, N. Paul, C., Herbison, P., McNoe, B., and Silva, P., 1996. "The Lifetime Occurrence of Sexually Transmitted Diseases Among a Cohort Aged 21", *New Zealand Medical Journal*, 109 (1028); 308-12.

Ericksen, K. P. and Trocki, K. F., 1994. "Sex, Alcohol and Sexually Transmitted Diseases: A National Survey", *Family Planning Perspective*, 26 (6): 257-63.

Franchini, F., Gilogiotti,A. R., Salvatore, A., Casini, T., Mazzoli, S., Concutelli, G., and Cocchi, P., 1996. "Adolescent Sexual Behaviour and Sexually Transmitted Diseases (STD): A Preliminary Study", *Pediart-Med-Chir*, 18 (3): 279-81.

Freud, S., (1856-1939). Quoted from S. Stein, *About Phobia*, Walker, New York, 1984.

Friedland, B., 1991. *Personality Disorders*, The Encyclopædia of Health, series: Psychological Disorders and their Treatments, New York: Chelsea House Publishers. pp. 33-40.

Friedman, S. R., 1995. "Promising Social Network Research Results and Suggestions for a Research Agenda", in R. H. Needle, S. L. Coyle, S. G. Genser, and R. T. Trotter (eds.), *Social Network, Drug Abuse and HIV Transmission*, Rockville, Md.: National Institute of Drug Abuse, NIDA Research Monograph 151. pp. 144-80.

Friedman, S. R., Neaigus, A., Jose, B., Curtis, R., Goldstein, M., Ildefonso, G., Rothenberg, R. B., and Des Jarlais, D. C., 1997. "Sociometric Risk Network and Risk for HIV Infection" *American Journal of Public Health*, 87 (8): 1289-1296.

Fulton, E. L., Kamal, N. Ahmed, S. M., Khan, M. S., 1997. Determinants of AIDS Awareness and Knowledge among Rural Men and Women in Bangladesh", special publication no. 57, Proceedings of the ASCON VI: Annul Scientific Conference, ICDDR,B, Dhaka, March, 1997.

Garnett, G. P., and Anderson, R. M., 1993. Contact Tracing in the Estimation of Sexual Mixing Patterns: The Epidemiology of Gonococcal Infections", *Sexual Transmission Diseases*. 20: 181-191.

Garrison W. L. and Marble, D. F. 1961. *The Structure of Transport Networks*. Report for the US Army Transportation Research Command, by the Transportation Centre at North Western University, Evanston, III.

GOB, 1997. *Document of the Workshop on Designing Behaviour Change Intervention for HIV among High Risk Population in Bangladesh*. prepared by CARE, Bangladesh for Bangladesh AIDS Prevention and Control Programme. Govt. of Bangladesh, Dhaka, August 1997.

Gordon, J. S., 1991. *Stress Management*, The Encyclopædia of Health, series: Psychological Disorders and their Treatments, New York: Chelsea House Publishers.

Gregory, D., 1978. *Ideology, Science, and Geography*, London: Hutchinson.

Grigg, D., 1967. "Regions, Models and Classes", in R. Chorley, and P. Haggett (eds.), *Models in Geography*, London & New York; Methuen.

Gwati, B., Guli, A., and Todd, C. H., 1995. "Risk Factors for Sexually Transmitted Disease amongst Men in Harare, Zimbabwe", *Central African Journal of Medicine*, 41(6): 179-81.

Habermas, J., (1987). *The Philosophical Discourse of Modernity: Twelve Lectures*, Cambridge: Polity Press.

Habermas, J., 1974. *Theory and Practice*, London: Heinemann.

Habermas, J., 1978. *Knowledge and Human Interests*, London: Heinemann.

Habermas, J., 1987. *The Theory of Communicative Action, Vol. 1: Reason and the Rationalisation of Society*, Boston: Beacon Press.

Hägerstrand, T., 1968. Innovation Diffusion as a Spatial Process, (English version) Chicago: University of Chicago.

Haggett, P., 1975. *Geography: A Modern Synthesis*, 2nd. Edition, New York: Harper & Row Publishers.

Haggett, P., 1990. *The Geographer's Art*, Oxford: Basil Blackwell Ltd.

Hanifi, M.A., Hossain, M., Aziz, A., Bhuiya, A., 1997. "Impact of AIDS Awareness in a Remote Rural area of Bangladesh", special publication no. 57, proceedings of the ASCON VI: Annul Scientific Conferencee, ICDDR, B, Dhaka, March 1997.

Haraldsdottir, S., Gupta, S., and Anderson, R. M., 1992. "Preliminary Studies of Sexual Network in a Male Homosexual Community in Iceland", *Journal of Acquired Immune Deficiency Syndrome*, 5: 374-381.

Haring, L. L. and Lounsbury, 1971. *Introduction to Scientific Geographic Research*, Lowa: WM. C. Brown Co. Publishers.

Hartshorne, R., 1939. *The Nature of Geography*, Lancaster: Association of American Geography.

Harvey, D., 1969. *Explanation in Geography*, London: Edward Arnold.

Harvey, D., 1973. *Social Justice and the City*, London: Edward Arnold.

Hiltabiddle, S. J., 1996. "Adolescent Condom Use, the Health Belief Model, and Prevention of Sexually Transmitted Disease", *Journal of Obstet Gynecological-Neonatal Nursing*, 25 (1):61-6.

Holmes, K. K., 1994. "Human Ecology and Behaviour and Sexually Transmitted Bacterial Infections", *Proceedings of National Academy of Sciences*, USA, 29: 91 (7): 2448-55.

Hossain S. M. I., Bhuiya, I., Streatfield, K., 1996. *Professional Blood Donors, Blood Banks and Risk of STDs and HIV/AIDS: A Study in Selected Areas in Bangladesh*, Regional Working Paper, No. 6. Dhaka: Population Council.

Hossain, M. A., Banik, N.G. and Rahmam, G. S., 1997. "Prevalence of RTI/STDs in Rural Areas of Bangladesh", *Report of Workshop on HIV/AIDS and Mobility, Media, Legal and Ethical Issues and Behavioural Research*, Dhaka: CCDB.

IEDCR, 1993. *HIV/AIDS Surveillance Activities*, Dhaka: Institute of Epidemiology, Disease Control and Research pp.1-8

Johnston, R. J., Gregory, D., Haggett, P., Smith, D., and Stoddart, D. R., 1981. *The Dictionary of Human Geography*, Oxford: Basil Blackwell Publisher, pp. 139-140; 239.

Kabir, A., Alam, R., Mian, M. A. H., Karim, E., Ahmed, Q. Islam, N. and Chowdhury, S. G. M., 1989. A study of *Institutionalised Prostitutes and Floating Gay Girls of Bangladesh*, unpublished report, IEDCR, Dhaka.

Kansky, K. J., 1963. *Structure of Transportation Network*, Chicago research Paper No. 84, University of Chicago, p. 8.

Keith Sabin, Mahbubur Rahman, Sarah Hawkes, Khaled Ahan, Lutfa Begum, Shams EL Arifen, Abdillah H. Baqui, 1997. "A Cross-sectional Study on the Prevalence of Sexually Transmitted Infections among Slum Dwellers", special publication no. 57, proceedings of the ASCON VI: Annul Scientific Conference, ICDDR,B, Dhaka, March, 1997. p. 21.

Khan, J. R. and Arefeen, 1992. "A Study on Prostitution in Bangladesh", *The Journal of Social Sciences*, 41:1-28.

Khan, J., 1996. "HIV/AIDS Prevention and Control in Bangladesh: Focussing on Targeled Interventions: A Case Study", *Green Voice*, 1(1): 1-10.

Khan, M. S. I. and Faisel, A. J. 1997. " Sexuality and Sexual Behaviors of Male STD Patients in Dhaka City", special publication no. 57, proceedings of the ASCON VI: Annul Scientific Conference, ICDDR,B, Dhaka, March, 1997. p.32.

Klovdahl, A. S, 1985. "Social Networks and the Spread of Infectious Diseases: the AIDS Example", *Social Science Med.*, 21: 1203-1216.

Klovdahl, A. S., Potteral J. J., and Woodhouse, D. E., 1994. "Social Networks and Infectious Disease: The Colorado Springs Study", *Social Science Med.*, 38: 79-88.

Latkin, C. A., 1995. "A Personal Network Approach to AIDS Prevention: An Experimental Peer Group Intervention for Street-Injecting Drug users: the SAFE Study", in R. H. Needle, S. L. Coyle, S. G. Genser, and R. T. Trotter (eds.), *Social Network, Drug Abuse and HIV Transmission*, Rockville, Md.: National Institute of Drug Abuse, NIDA Research Monograph 151, pp. 181-95.

Lemardeley, P., Diallo, A., Gueye, N., Diaye, A., Becker, C., Mboup, S., Rey, J. L., 1995. Evaluation of the Risk of Sexually Transmitted Diseases and HIV Infection in a Rural Region in Senegal", *Sante*, 5(1): 43-8.

Little, M., 1991. *Sexual Transmitted Diseases*, The Encyclopaedia of Health, series: Medical Disorders and their Treatments, New York: Chelsea House Publishers.

Lowry, Ira. S., 1965. " A Short Course in Model Design", *Journal of American Planners*, 30: 315-47. Recited from Peter Haggett (1990) *op. cit.* p.103.

Mahbub, A. Q. M., 1985-1986. "Mobility Pattern of Working People from Rural Areas in Bangladesh" *Oriental Geographers*, XXIX-XXX (1&2): 73-91.

Mahbub, A. Q. M., 1997. *Mobility Behaviour of Working People in Bangladesh: Rural-Rural and Rural-Urban Circulation*, Dhaka: USP, Dept. of Geography and Environment, Dhaka University.

Malkhazova, S. M., Phillips, D. R., Tikunov, V. S., and Verhasselt, Y. 1997. "Public Health and Environment Pollution in Russia: A Methodology for the Assessment of Critical Ecological Situations", *IGU Bulletin* 47 (1), 1997. pp. 5-16.

Matondop; R. Wall, K. Morgan, M. Hickman, C. Dore, M. Karrpembwa, 1998. "Epidemiology of Gonococcal and Chlamydial Infections in Harrow and Brent", *Genitourin-Med.*, 75 (5): 352-7.

McQuitty, L.L. 1957. "Elementary Linkage Analysis for Isolating Orthogonal and Oblique types and Typal Relevancies", *Educational and Psychological Measurement*, 17, 207-29.

Mercer, D. C. and Powell, J. M., 1972. *Phenomenology and Related Non-positivistic Viewpoints in the Social Sciences*, Clayton: Monash Publications in Geography, No.1.

Meria, P., Janier, M., Desgrandchamps, F., Cortesse, A., Cussennot, O., Casin, I, Teillac, P., Korel, P., and Le Duc, A., 1996. "Sexually Transmitted Diseases in Men", *Prog. Urol.*, 6 (3): 447-54.

Mian, M. A. H. & Karim, E., 1993. "STD Situation", in the proceedings of the Workshop on Development of Strategies for Prevention and Control of STD in Bangladesh, STD Project, DG Health, Ministry of Health & Family Welfare, Dhaka, 11 & 12 Oct.1993. pp. 22-25.

Millon, T., 1981. *Disorders of Personality*: DSM-III: Axis II, New York: Wily.

Morrill, R. L., 1974. *The Spatial Organisation of Society*, N. Scituate, Mass.: Duxbury Press.

Moses, S., Muia, E., Bradley, J. E., Nagekerke, N. J., Ngugi, E. N., Njeru, E.K., Eldridge, G., Olenja, J., Wotto, S., Plummer, F. A., and others, 1994. "Sexual Behaviour in Kenya: Implication for Sexually Transmitted Disease Transmission and Control", *Social Scientific Medicine*, 39 (12): 1649-56.

Mulhall, B. P., 1996. "Sex and Travel: Studies of Sexual Behaviour, Disease and Health Promotion in International Travellers: A Global Review" [editorial], *International Journal STD/AIDS*, 7(7): 455-65.

Myaux, J., Ali, M., and Hawkes, S., 1997. "Environmental Determinants for Sexually Transmitted Diseases in Rural Setting of Bangladesh", special publication no. 57, proceedings of the ASCON VI: Annul Scientific Conference, ICDDR, B, Dhaka, March, 1997. p. 82.

N. Islam, 1996. *Dhaka: From City to Megacity*, USP: Dept. of Geography and Environment. University of Dhaka. p. 95.

NAC, 1990. *KABP Survey in Relation to AIDS in Bangladesh*, a government report, National AIDS Committee, Dhaka.

NAC, 1991. *AIDS Sentinel and Serosurvey*, Annul Report, National AIDS Committee, in co-operation with Institute of Epidemiology, Disease Control and Research, Dhaka.

NAC, 1992. *HIV/AIDS Prevention in Bangladesh*, National AIDS Committee, Dhaka.

NAC, 1997. *Workshop Manuel on HIV/AIDS Programme Planning Using the Logical Frame*, Workshop held in Dhaka, on August 5-7, 1997.

Nardo, D., 1991. *Anxiety and Phobias*, The Encyclopædia of Health, series: Psychological Disorders and their Treatments, New York: Chelsea House Publishers.

National Policy on HIV/AIDS and STD Related Issues, (final draft), BAPC/NAC/STD Project/DGHS, Ministry of Health and Family Welfare, Govt. of Bangladesh, Dhaka, October, 1996.

Naved, R. T., 1997. "Risky Sexual Behavior in a Conservative Society", special publication no. 57, proceedings of the ASCON VI: Annul Scientific Conference, ICDDR, B, Dhaka, March, 1997.

Neaigus, A., Friedman, S. R., Curtis, R., *et al.*, 1994. "The Relevance of Drug Injectors' Social Networks and Risk Networks for Understanding and Preventing HIV Infection" *Social Science Medicine*, 38: 67-78.

Norcliffe, G. B., 1977. *Inferential Statistics for Geographers*, London: Hutchinson.

OECD, 1988. *Evaluation in Developing Countries: A Step in a Dialogue*, a report of the Development Assessment Committee, expert group on AID Evaluation, Paris: Organisation for Economic Co-operation and Development (OECD).

Olsson, G. 1967. "Deductive and Inductive Approaches to Model Formation", *Proceedings of the First Scandinavian-Polish Regional Science Seminar*, Committee for Space Economy and Regional Planning of the Polish Academy of Sciences, Studies, vol. 17, Warszawa: PWN.

Olsson, G., 1968. "Complementary Models: A Study of Colonisation Maps", *Geografisca Annaler-B*, 50 (2): 115-132.

Osewe, P. L., Peterman, T. A., Ransom, R. L., Zaidi, A. A., and Wroten, J. E., 1996. "Trends in the Acquisition of Sexually Transmitted Diseases among HIV Positive Patients at STD Clinics, Miami, 1988-92", *Sexual Transmitted Diseases*, 23 (3): 230-3.

Paget, W. G. and Zimmermann, H. P., 1997. "Surveillance of Sexually Transmitted Diseases in Switzerland, 1973-94: Evidence of Declining Trends in Gonorrhoea and Syphilis", *Soz-Praventivmed*, 42 (1): 30-6.

Pakianathan, M. R., 1996. "Characterising Patients with Multiple Sexually Acquired Infections: A Multivariate Analysis", *International Journal of STD/AIDS*, 7 (5): 359-61.

Pharn Kanter, G. B., Steinberg, M. H., and Ballard, R. C., 1996. "Sexually Transmitted Diseases in South Africa", *Genitourin Med.*, 72 (3): 160-71.

Pickles, J., 1985. *Phenomenology, Science, and Geography: Spatiality and the Human Sciences*, Cambridge: Cambridge University Press.

Piot, P. and Islam, M. Q., 1994. "Sexually Transmitted Diseases in the 1990s: Global Epidemiology and Challenges for Control", *Sexually Transmitted Diseases*, 21 (2 Suppl.): S7-13.

Pooler, J. A., 1977. "The Origin of Spatial Tradition in Geography: An Interpretation", *Ontario Geography*, 11:56-883

Potterat, J. J., Rothenberg, R. B., and Woodhouse, D. E., 1985. "Gonorrhoea as Social Disease", *Sexual Transmission Diseases*, 12: 25-32.

Rahman, M., Khuda, B. E., Reza, M., 1997. "AIDS Awareness in Rural Chittagong", special publication no. 57, proceedings of the ASCON VI: Annul Scientific Conference, ICDDR,B, Dhaka, March, 1997.

Roddy *et al.*, 1989. Quoted from Mian, M. A. H. & Karim, E., 1993. "STD Situation", in the proceedings of the Workshop on Development of Strategies for Prevention and Control of STD in Bangladesh, STD Project, DG Health, Ministry of Health & Family Welfare, Dhaka, 11 & 12 Oct. 1993. pp. 22-25.

Roderick, R., 1986. *Habermas and the Foundations of Critical Theory*, Masingstoke: Macmillan.

Rodgers, J. E., 1988. *Drug and Sexual Behaviour*, the Encyclopædia of Psychoactive Drugs, series 2, New York: Chelsea House Publishers, 1988. p.23.

Rothenberg, R. B., and Potterat, J. J., 1988. "Temporal and Social Aspects of Gonorrhoea Transmission", *Sexual Transmission Diseases*, 15: 88-95.

Rothenberg, R. B., Potterat, J. J., Woodhouse, D. E., Darrow, W. W., Muth, S. Q., and Klovdahl, A. S, 1995. "The Colorado Springs Study of Social Network: Observations on Centrality", *Social Network*, 17: 273-297.

Rothenberg, R. B., Woodhouse, D. E., Potterat, J. J., Darrow, W. W., Muth, S. Q., and Klovdahl, A. S, 1995. "Social Networks in Disease Transmission: the Colorado Springs Study", in R. H. Needle, S. L. Coyle, S. G. Genser, and R. T. Trotter (eds.), *Social Network, Drug Abuse and HIV Transmission*, Rockville, Md.: National Institute of Drug Abuse, NIDA Research Monograph 151, pp. 3-19.

Sake, R. D., 1980. *Conceptions of Space in Social Thought: A Geographic Perspective*, London: Macmillan. p. 50.

Sarkar, S., Durandin, F., Mandal, D., Corbilt, G., and Islam, N., 1997. "High STD and Low HIV Prevalence among Commercial Sex-Workers (CSWs) in a Brothel of Bangladesh: Scope for Prevention", special publication no. 57, proceedings of the ASCON VI: Annul Scientific Conference, ICDDR,B, Dhaka, March, 1997.

Schaefer, F. K., 1953. "Exceptionalism in Geography: A Methodological Examination", *Annals of Association of American geographers*, 43: 226-49.

Schærstrom, A. 1996. "Pathogenic Paths? A Time Geographical Approach in Medical Geography", Meddelanden Från Lunds Universitets geografiska Institutioner, quoted from the critique on the doctoral thesis by Aase, Asbjørn, in *Geografiska Annaler*, 79 B (1997).1 pp. 57-59.

Seal, D. W., and Agostinelli, G. 1996. "College Students' Perceptions of the Prevalence of Risky Sexual Behaviour" *AIDS-Care*, 8(4): 453-66.

Sebastian, R., 1991. *Compulsive Behaviour*, The Encyclopædia of Health, Series: Psychological Disorders and their Treatment, New York: Chelsea House Publication.

Seidman, S. B., 1983. "Network Structure and Minimum Degree", *Social Network*, 5: 269-287.

Selue, H., 1978. *The Stress of Life*, 2nd edition, NY: McGraw Hill.

Sharma, A., Nahar, P., Sabin, K., Begum, L., Ahsan, K., Arifeen, S. E., and Baqui, A. H., 1997. " Sexual Behaviors among Cases with Sexually Transmitted Diseases in Dhaka Slums",

special publication no. 57, proceedings of the ASCON VI: Annul Scientific Conference, ICDDR,B. Dhaka, March, 1997. p. 28.

Shrestha, B. K., Rao, A., Sundararaman, S., and Bennet, T., 1992. "Risk along the Truck Routes Connecting Northern Indian, Bangladesh, and Nepal Borders", assessment report, conducted by Bhoruka Haematology Institute with support from AIDS Research Foundation, India/AIDSCAP, USA.

Siddique, K. Qudir, S. R., Alamgir, S. and Huq, S., 1990. *Social Formation in Dhaka City*, Dhaka: University Press Ltd. pp. 285-303.

Stedman's Medical Dictionary, (23rd edition), 1982. New Delhi: S. Chand & Co. Ltd.

Steeoff, R., 1990. *Adolescence*, the Encyclopædia of Health, series: The Life Cycle (series editors: C. Dale and M. D. Garell), New York, USA: Chelsea House Publishers. p. 69.

Stein, S., 1984. *About Phobis*, NY: Walker.

Stimson, G. V., 1994. "Reconstruction of Sub-regional Diffusion of HIV Infection among Injecting Drug Users in South-east Asia: Implications for Early Intervention", *AIDS*, 8: 1630-1632.

Taber's Cyclopedic Medical Dictionary, (Indian Edition), 1993. New Delhi: Jaypee Brothers.

Taha, A., 1992. *Areal Photography and Network Analysis*, (in Bengali) Rajshahi: Rajshahi University Textbook Publishing Board.

Taufiqunnesa, U. K., Haq, M. A. & Ahmed, S., 1993. "Characteristics of Infection with STD: A Survey among Patients Attending OPD of Dhaka Medical College Hospital" *JOPSOM*. 12 (1): 3-6.

Thomas, J. C. and Tucker, M. J., 1996. "The Development and Use of the Concept of a Sexually Transmitted Disease Core", *Journal of Infective Diseases*, 174 suppl. 2: S134-43.

Trotter, R. T. II, Rothenberg, R. B., Coyle, S. L., 1995. "Drug Abuse and HIV Prevention Research: Expanding Paradigms and network Contributions to Risk Reduction", *Connections*, 18: 29-45.

Trotter, R. T., Baldwin, J. A. Bowen, A. M., 1995. "Network Structure and Proxy Network Measures of HIV Drug and Incarceration Risk for Active Drug Users. *Connections*, 18: 89-104.

Trotter, R. T., Bowen, A. M., Potter, J. M., 1995. "Network Models for HIV Outreach and Prevention Programs for Drug Users" in R. H. Needle, S. L. Coyle, S. G. Genser, and R. T. Trotter (eds.), *Social Network, Drug Abuse and HIV Transmission*, Rockville, Md.: National Institute of Drug Abuse, NIDA Research Monograph 151. pp. 144-180.

Tuan, Yi-fu. 1976. "Humanistic Geography", *Annals, Association of American Geographers* 66(2): 166-76.

UN, 1970. "Methods of Measuring Internal Migration". *Population Studies*, No. 47, New York: United Nations.

UNESCO, 1976. The Use of Socio-economic Indicators in Development Planning, NY: UN

UNICEF, 1991. A UNICEF Guide for Monitoring and Evaluation: Making a Difference? New York: UNICEF, Evaluation Office.

UNICEF, 1997. Quoted from "Document of the Workshop on Designing behaviour Change Intervention for HIV among High Risk Population in Bangladesh", a training document prepared by Care, Bangladesh for BAPC, Govt. of Bangladesh. p. 15.

Unwin, T. 1992. *The Place of Geography*, UK: Longman.

VHSS, 1993 *A Study on Population Policy Report*, Dhaka: Voluntary Health Services Society,

Wasserheit, J. N., and Aral, S. O., 1996. "The Dynamic Topology of Sexually Transmitted Disease Epidemics: Implications for Prevention Strategies", *Journal of Infectious Diseases*, 174 (Suppl 2): S201-13.

Wasserheit, J. N., Harirs, J. R., Chakraborty, J., Key, B. A., and Mansom, K. J., 1989. "Reproductive Tract Infection in a Family Planning Population in Bangladesh" *Studies in Family Planning* 20 (2): 69-79.

Wasserman, S., and Faust, K., *Social Network Analysis: Methods and Applications*, Cambridge, England: Cambridge University Press.

Whittlesey, D., 1954. "The Region, Theory and Practice", in P. E. James and D. F. Jones (eds.) *American Geography: Inventory and Prospect*, Syracuse NY: Syracuse University Press. pp. 32-51.

WHO, 1987. *Report of the Consultation on International Travel and HIV Infection*, Geneva: WHO/SPA/GLO/87.1, 2-3 March 1987.

WHO, 1990. *Consensus Statement on Global Strategies for Co-ordination of AIDS and STD Control Programmes*, document WHO/GPA/INF/90.2., World Health Organisation, Geneva, July, 1990.

WHO, 1991(a). *Global Programme on AIDS: A Progress Report*, (NLM Classification: WD 308), World Health Organisation, Geneva, 1991. p. 89.

WHO, 1991(b). *External Report on Operational Relationships between Programmes for Prevention and Control of AIDS and STD*, submitted to sixth GPA meeting, World Health Organization, Geneva, April, 1991.

WHO, 1991(c). *Management of Patient with Sexually Transmitted Diseases: Report of a WHO Study Group*, WHO Technical Report Series, No.810. World Health Organization, Geneva, April, 1991.

WHO, 1995. *AIDS Prevention and Care in the Workplace: Southeast Asia*, New Delhi. p. 3.

Williams, M. S., and Johson, J., 1993. "Social Network Structures: An Ethnographic Analysis of Intravenous Drug Use in Houston, Texas", *Drug Society*, 7: 65-90.

Williams, M. S., and Johson, J., 1993. "Social Network Structures: An Ethnographic Analysis of Intravenous Drug Use in Houston, Texas", *Drug Society*, 7: 65-90.

Woodhouse. D. E., Rothenberg, R. B., Potterat, J. J., *et al.*, 1994. "Mapping a Social Network of Heterosexuals at High Risk for Human Immunodeficiency Virus Infection", *AIDS*, 8: 1331-1336.

World Bank, 1977. *A Multipurpose Household Questionnaire: Basic Economic and Development Modules*, Washington D. C., WB.

End Notes

1. *The Daily Janakantha*, 23 May, 1998, p. 12
2. *The Daily Janakantha*, 30 May, 1998
3. *The Daily Janakantha*, 21 December, 1998
4. *The Daily Janakentha*, 26 May, 1998
5. Organized road transport includes Bus, Mini-bus, Microbus, Jeep, Car, Truck *etc.* (*Statistical Yearbook of Bangladesh*, BBS, 1997, p. 276).
6. Discussion with an Assistant. Director of BRTA, 1997
7. *The Daily Janakantha*. 14 April, 1998
8. For details of income groups in Dhaka city: N. Islam *(op cit. main reference)*
9. For details of the social classes in Dhaka city: K. Siddiqui *et al., (op cit. main reference)*
10. Discussion with the STD counselors at *CEDAR Sheba Kendra*, Aricha; and also see Khan, 1996; CEDAR, 1995 (*op cit.* main reference).
11. Discussion with an Assistant Commissioner of Customs, Custom House, Dhaka, 1988
12. *The Daily Janakantha*, 4 July 1998
13. Discussion with Professor Nazrul Islam, Chairman, Dept. of Virology, Bangabando Shaikh Mujib Medical University, Dhaka, 1998.
14. *The Daily Independent*, 6 August, 1997

Appendix 1

Subject Consent, Declaration and Questionnaire (Translated in English)

Dear Respondents,

I am a research student in the Department of Geography and Environment, University of Dhaka. The present research is an academic endeavour in partial fulfilment of the requirements for the degree of Master of Philosophy in Geography and Environment. However, for my M.Phil. Degree I am working on the vulnerability to STD/AIDS among the long-distance truck drivers in Bangladesh. In this research I am trying to explore the locational vulnerability to STD/AIDS through trucker community, its geographical and environmental determinants, spatial distribution, regions *etc.* The truckers have been chosen as respondents to my research investigation in an intention to meet the problems and vulnerability of truckers to STD/AIDS in the light of the total milieu of trucking profession. I hope my research findings will be useful in the planning of STD/AIDS prevention as well as total betterment for the community in the future.

For confidentiality, it is, however, declared that the collected data and information will only be used for research purposes. Non-judgemental principle will be followed in the whole research work and therefor ensured that no judgmental or conventional social and legal words (*e.g.* illicit sex work or relationship *etc.*) will be used. The questionnaire will be anonymous and the collected data will be considered to be private and confidential.

If you have any further question regarding the research work or related issues, please feel free to ask me personally or the person assigned for data collection.

Please answer all of the questions in the light of your own personal experience, or in case of others you certainly know as truth, or you have seen that happened.

I shall be very much obliged if you kindly co-operate with us with your valuable time and knowledge.

Thanking You

Jamal Khan
M. Phil. Researcher
Department of Geography and Environment
University of Dhaka, Dhaka

SPATIAL ASPECTS OF THE VULNERABILITY TO STD/AIDS

AMONG THE LONG-DISTANCE TRUCK DRIVERS IN BANGLADESH

Department of Geography and Environment
University of Dhaka

Sample No. _____

Name of the interviewer _____
Site _____ Date _____

(NB: Dear interviewers, please consider the notes and expianations of several questions carefully and deal the questions accordingly. Please collect data accessories and tailed-information where needed. Insert separate page in case of details note taking)

A. Questions on Socio-economic Characteristics

Occupation: (only for inter-district truck drivers) _____
How long you have been keeping yourself with this line (year) ? _____
At what age you have started this profession ? _____
Who took you this line and how you become a driver ? _____
_____

Age _____ Sex _____ Education _____

Religion (please note religious value and conventional beliefs) _____
_____

Marital Status (mark ✔)
- Unmarried ☐
- Married ☐
- Separated ☐

No. marriages _____ No. of wives at present _____

Family type _____ Family size _____ No. of dependants _____

Birthplace (village / Town) _____ Home district (only district name) _____
Present residence (mark ✔)
- Near to the truck owner's residence ☐
- Near to the origin stand ☐
- Near to the both ☐
- Others (please specify) _____

Housing quality of the present residence (*e.g.* mess, low-income housing *etc.*) _____
Living with family at present residence (Yes / No) _____

Did you ever go abroad (where and how) ? _____
_____

Gross income (monthly / yearly)
- As salary _____
- Others _____

Expenditure pattern (in *per cent*)

On house rent _____
On family maintenance _____
On personal cost _____

Net savings (yearly) _____
Use of savings _____
Off-time recreation (at stand or on the way) _____

Means of communication (*e.g.* Radio, TV. Newspaper, friends *etc.*) _____

B. Questions on Mobility Behaviors

Duration of absence from family (average days or months) _____
Trips made during last three months (in percent)

Inter-district trip _____
Local trip _____

How many days you had to stay on road during last three months? _____
Usual non-stop driving hours _____

Experiences regarding travelling times in different routes _____
_____

Experiences regarding harassment on the highways in different route _____
_____

Nature of stopovers and resting places on the highways _____
_____

C. Questions for KAP Survey

Please describe your conceptions about sexual diseases (*e.g.* general nature, exposures, transmission routes, prevention measures and related conventional conceptions, misconceptions, beliefs, threats *etc.*) _____
_____
_____

Please mention name of the few STDs you have heard (in conventional terms)

a. _____
b. _____

Have you ever heard about AIDS ? _____
Please narrate your knowledge and conceptions of AIDS (*e.g.* transmission route, prevention methods *etc.*) _____
_____

Conceptions and practices of safer sex with condom (*e.g.* frequency of condom use, use of condom in safer sex practices, knowledge of correct use of condom, attitude towards the use of condom *etc.*) _____
_____

Attitude and practices of drugs and other forms of addictions _____
_____

Shaving practice (*e.g.* usual habit and related risk) _____
_____

D. Question on Sexuality and STD

First age of sex experience (year) _____
First sex with whom (mark ✔)
CSWs ☐
Others (specify) _____
Nature of places _____

Had you have pre-marital/extra-marital sex (yes / No)? _____

Specify usual or occasional styles of sex you have performed with the partners _____

Number of sex partners you had during last three months _____
Nature of places _____
Relationship with the sex partners _____
Number of sex partners you had during the whole trucking life _____
Nature of places
Relationship with the sex partners _____

Specify usual times of performing sexual and other risk activities
Time _____ Degree of risk activities _____
_____ _____

Occurrences of STDs last three months (no. of occurrences) _____
Specify the places you suspected to be the origin of your STD _____
Other places you know certainly being the origin of STD _____
Specify climatic seasons _____
Lifetime occurrences of STD (no. of occurrences) _____
Specify the places you suspected to be the origin of your STD _____
Other places you know certainly being the origin of STD _____
Specify climatic seasons _____

E. Open Questions

Do you think performing of sexuality and other risk behaviors are space oriented and related to your mobile life? (specify the degree of risk activities in different places)
Places _____ Degree of risk activities _____
_____ _____

How do you usually make decision about visiting brothel in particular location (recalled your last incident of visiting brothel and describe how you had come into decision) _____
_____
_____

Are there any specific factors that inspired or persuaded you in making such decision (recalled your last incident of visiting brothel and describe how you had come into decision?) _____
_____
_____

What're you think about prevention measures of STD/AIDS for trucker community? _____
_____

Have you any comment or anything more to say? _____
_____

Information/Data Collected at Organizational Level (Checklist)

From Owner and Truckers' Organizations

- Number of Truckers' Unions, branch offices, members, fees and other responsibilities and benefits;
- Number of trucks, types of truck, and licensing / registration system;
- Trucking zone (route and time zone);
- Number of truck stands, its locations and sizes, and other spatial characteristics;
- Average Dhaka-based inter-district trip pattern (O-D Matrix);
- General trucking pattern by routes;
- Trucking bases in the country;
- Major truck routes in the country;
- Maximum and minimum trips of a trick;
- Seasonal variation in trucking flow, peak and down seasons in trucking business;
- Owner association, its members, branches and other organizations related to trucking profession;

From Government Organizations

- Number, location and other spatial characteristics of land and sea ports in the country;
- Number, location and other spatial characteristics of ferry *ghats* and other transits points;
- Number of registered trucks and HTV license-holder truck drivers *etc.*;
- General rules for registration, route permit, fitness certificate, and other legal procedure;
- Number, location, authorisation and other spatial characteristics of truck stands

From Non-Governmental Organizations

- Number, location, and other spatial characteristics of NGO interventions for STD/AIDS prevention;
- Number, location, and other spatial characteristics of NGO interventions for STD/AIDS prevention especially for truckers community;

List of the Professionals with whom Methodological Discussions were Made

Name of Experts	Professional Identity	Address
Mr. David Gordon	Short-time Consultant to NAC	National AIDS Committee (NAC), Dhanmondi, Dhaka
Dr. Malabika Sarker	M.B.B.S., MPH (Harvard), Ph.D. Scholar	The University of Alabama at Birmingham
Dr. Md. Ahsanul Kabir	Medical Officer	Institute of Epidemiology, Disease Control and Research (IEDCR), Dhaka
Dr. Sharif. M. Ismail Hossain	Program Officer	The Population Council, Dhaka
Dr. Sukanta Sarker	Program Manager	AVSC International, Dhaka.
Ms. Joyce Djaelani Gordon	Short-time Consultant to NAC	National AIDS Committee (NAC), Dhanmondi, Dhaka
Mr. Maurice Bloen	Consultant, STD/AIDS	CCDB, Dhaka
Professor A. Q. M. Mahbub	Professor of Geography and Expert in Population and Migration	Department of Geography and Environment, University of Dhaka.
Professor Abdul Baquee	Professor of Geography	Department of Geography and Environment, University of Dhaka.
Dr. Sarah Hawkes	Director, STD Div.	ICDDR, B, Dhaka.
Dr. Swarup Sarker	Co-ordinator, SHAKTI	Care, Bangladesh.
Mr. Joachim Victor Gomez	Health Anthropologist	CCDB, Dhaka

Organisations Visited and Surveyed

A. Truckers' Organizations:

- Bangladesh Truck Chalok and Sramik Federation
- Bangladesh Truck Drivers Union, Dhaka
- Inter-District Truck Drivers Union, Dhaka

B. Owner Association:

- Bangladesh Truck Owners Association, Dhaka

C. Government Organizations

- National AIDS Committee (NAC), Dhanmondi, Dhaka
- Bangladesh Road Transport Authority (BRTA)
- BIWTC Area Office, Aricha *Ghat*
- Customs House, Dhaka

D. Non-Governmental Organisations and others

- Bangladesh Medical Research Council (BMRC)
- HASAB NGO Support Programme, Dhaka
- Care, Bangladesh, Dhaka
- ActionAid, Dhaka
- International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B), Dhaka
- Christian Commission for Development in Bangladesh (CCDB), Dhaka

List of the Key Informants Interviewed

Name	Designation	address
Mackbul Ahmed	Ex-Central Chairman	Head office, Bangladesh Truck Drivers Union, Tejgaon, Dhaka.
M. Shamsul Huq	Ex-Acting Chairman	Head office, Bangladesh Truck Drivers Union, Tejgaon, Dhaka.
Christopher Gomes	Central Chairman	Head office, Bangladesh Truck Owner Association, Tejgaon, Dhaka.
Rustom Ali Khan	Central Sectary	Head office, Bangladesh Truck Owner Association, Tejgaon, Dhaka.
Kazi Lutfur Rahman	Asstt. Director	BRTA, Mirpur, Dhaka.
Lukman Hossain Mulla	Public Relation	BRTA head office, New Airport road, Dhaka.
Md. Salam	Chairman	Bangladesh Truck Drivers Union, Tejgaon, Dhaka.
Md. Ismail	President and Secretary	Bangladesh Truck Chalok-Sramik Federation & Inter-district Truck Drivers Union
Raw Rames	Secretary and Secretary	Bangladesh Truck Chalok-Sramik Federation Bangladesh Truck Drivers' Union, Dhaka
Kafil Uddin	President	Inter-district Truck Drivers Union
Mr. Zakir Hossain,	Superintendent	BIWTC serial box, Aricha *ghat*
Mr. Nurul Alam	AGM	BIWTC area office, Aricha *ghat*
Md. Moinul Hossain Khan	Assistant. Commissioner	Customs House, Dhaka
Jakir Hossain	A senior driver	Tejgaon truck terminal, Dhaka
Abul Kalam	Workshop owner	Tejgaon truck terminal, Dhaka
Mr. Majibur Rahman	A truck owner	Indira road, Farmgate, Dhaka

List of Truck Stands in Bangladesh

No.	Name & Location of Truck Stands	Routes	Size (standby truck)	Type
1	Aminbazar	Dhaka City	400-500	Stand
2	Bagbari, Mirpur	Dhaka City	300-400	Terminal
3	Dayagonj	Dhaka City	150-200	Terminal
4	English road	Dhaka City	50-60	Stand
5	Gabtali	Dhaka City	100-150	Stand
6	Mohamadpur	Dhaka City	150-200	Stand
7	Nayabazer	Dhaka City	50-60	Stand
8	Saidabad	Dhaka City	100-150	Stand
9	Tejgaon	Dhaka City	500-700	Terminal
10	Tikatoli	Dhaka City	50-60	Stand
11	Bandarban	Dhaka-Chittagong	10-20	Stand
12	Charmatha, Comilla	Dhaka-Chittagong	20-30	Stand
13	Cox'sbazar	Dhaka-Chittagong	30-35	Stand
14	Khagrachari	Dhaka-Chittagong	<10	Stand
15	Laksham	Dhaka-Chittagong	<10	Stoppage
16	Lakshmipur	Dhaka-Chittagong	<10	Stand
17	Lama	Dhaka-Chittagong	<10	Stoppage
18	Landon Ghat, Chandpur	Dhaka-Chittagong	<10	Stand
19	Mahipal, Feni	Dhaka-Chittagong	10-20	Stand
20	Majir Ghat, Chittagong	Dhaka-Chittagong	100-150	Stand
21	Matherbari, Chittagong	Dhaka-Chittagong	150-200	Stand
22	Nitaigonj, Narayanganj	Dhaka-Chittagong	200-300	Stand
23	Noakhali	Dhaka-Chittagong	20-30	Stand
24	Pagla, Narayangonj	Dhaka-Chittagong	400-500	Stand

54	Bhurimari, Dinajpur	Dhaka-North	50-60	Stoppage
55	Charmatha, Bogra	Dhaka-North	100/150	Stand
56	Chilmari, Rangpur	Dhaka-North	<10	Stand
57	Collage road., Rangpur	Dhaka-North	30-40	Stand
58	Dhaka road., Manikganj	Dhaka-North	10-20	Stand
59	Hili, Dinajpur	Dhaka-North	50-100	Parking-lot
60	Ishurdi, Pabna	Dhaka-North	<10	Parking-lot
61	Joypurhat	Dhaka-North	20-30	Stand
62	Kurigram	Dhaka-North	<10	Stand
63	Madhupur, Thakurgaon	Dhaka-North	50-60	Stand
64	Midapukur, Rangpur	Dhaka-North	<10	Stoppage
65	Nachol, Rajshahi	Dhaka-North	<10	Stoppage
66	Nagarbari, Sirajganj	Dhaka-North	300-400	Parking-lot
67	Naogaon, Manikganj	Dhaka-North	90-100	Stand
68	Narail	Dhaka-North	<10	Stoppage
69	Nawabganj, Rajshahi	Dhaka-North	<10	Stand
70	Nilphamari	Dhaka-North	<10	Stand
72	Pachbibi, Jaipurhat	Dhaka-North	<10	Stand
73	Pakshi	Dhaka-North	150-200	Parking-lot
74	Panchagarh	Dhaka-North	20-22	Stoppage
75	Parbatipur, Dinajpur	Dhaka-North	10-20	Stoppage
76	Saidpur	Dhaka-North	30-40	Stand
77	Santahar	Dhaka-North	20-30	Stand
78	Savar	Dhaka-North	10-20	Stoppage
79	Sheb bazar, Rajshahi	Dhaka-North	30-35	Stand
80	Sirajganj	Dhaka-North	40-50	Stand
81	Sonamasjid, Rajshahi	Dhaka-North	<10	Stoppage
82	Station road., Gaibandha	Dhaka-North	<10	Stand
83	Station road., Lalmonirhat	Dhaka-North	20-30	Stand

84	Tinmatha, Pubna	Dhaka-North	30-35	Stand
85	Ullapara, Sirajganj	Dhaka-North	<10	Stand
86	Uthali, Manikganj	Dhaka-North	80-100	Stand
87	Alamdanga, Chuadanga	Dhaka-South	30-40	Stand
88	Bagerhat	Dhaka-South	30-50	Stand
89	Benapole, Jessore	Dhaka-South	300-400	Parking-lot
90	Bherama, Kustia	Dhaka-South	80-100	Stand
91	Bhomra, Khulna	Dhaka-South	<10	Border
92	Borguna	Dhaka-South	<10	Stoppage
93	Chadangamore, Meherpur	Dhaka-South	30-35	Stand
94	Custom Ghat, Khulna	Dhaka-South	30-40	Parking-lot
95	Darsana, Meherpur	Dhaka-South	<10	Stoppage
96	Daulatdia Ghat	Dhaka-South	150-200	Parking-lot
97	Faridpur	Dhaka-South	30-40	Stand
98	Gitanjali Sarak, Jhenaidah	Dhaka-South	100-150	Stand
99	Gopalganj	Dhaka-South	<10	Stand
100	Jhalakathi	Dhaka-South	<10	Stand
101	Kaligonj, Jhenaidah	Dhaka-South	90-100	Stand
102	Khulna stand, Jessore	Dhaka-South	50-60	Stand
103	Madaripur	Dhaka-South	<10	Stand
104	Magura	Dhaka-South	30-35	Stand
105	Maniktala, Khulna	Dhaka-South	100-150	Stand
106	Mawya	Dhaka-South	150	Parking-lot
107	Mongla port, Bagerhat	Dhaka-South	30-35	Parking-lot
108	Morrelganj, Bagerhat	Dhaka-South	<10	Stoppage
109	Munshiganj	Dhaka-South	<10	Stoppage
110	Nawabganj	Dhaka-South	<10	Stoppage
111	Patuakhali	Dhaka-South	10-20	Stand
112	Rail station, Kustia	Dhaka-South	150-200	Stand

113	Razbari	Dhaka-South	<10	Stand
114	Sadar road., Chuadanga	Dhaka-South	20-30	Stand
115	Shariatpur	Dhaka-South	<10	Stand
116	Station road., Barisal	Dhaka-South	50-60	Stand
117	Sundarban Textile Mil, Satkhira	Dhaka-South	100-150	Stand
118	Akhaura, Brahmanbaria	Dhaka-Sylhet	<20	Stoppage
119	Amberkhana, Sylhet	Dhaka-Sylhet	10-20	Stand
120	Bhairab	Dhaka-Sylhet	100-150	Parking-lot
121	Brahmanbaria	Dhaka-Sylhet	<10	Stand
122	Habijanj	Dhaka-Sylhet	<10	Stand
123	Kadomtali, Sylhet	Dhaka-Sylhet	10-20	Stand
124	Moulvibazar	Dhaka-Sylhet	20-25	Stand
125	Old rail station, Sylhet	Dhaka-Sylhet	10-20	Stand
126	Sirmangal	Dhaka-Sylhet	<10	Stand
127	Sobhani Ghat, Sylhet	Dhaka-Sylhet	<10	Parking-lot
128	Sunamganj	Dhaka-Sylhet	<10	Stand
129	Sylhet	Dhaka-Sylhet	20-30	Stand
130	Tamabil, Sylhet	Dhaka-Sylhet	10-20	Stoppage

Source: *Organisational and Qualitative Survey, 1997.*

Note 1: *Data have been collected from the discussion with the key-informants and with the respondents as well. However necessary correction and validation was also done through cross-checking and measuring up.*

Note 2: *Definitions of truck terminal, stand, stoppage and parking-lot have been given in the text.*