Research on Humanities and Social Sciences
ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online)
Vol.3, No.2, 2013

Sexual Networking Analysis in the Context of International Circulatory Migration: Exploring an Analytic-Perspective Gap on Mobile Population's Sexuality.

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Abstract

The current analytical perspectives on the sexual networking, specifically in the context of differential sexuality risk committal of mobile groups in their various destinations appear rather narrow. Specifically, it has to a large extent omitted what the geo-transportation perspective analysis of that concept stands to offer both theory and intervention on sexual behaviour of mobile population groups. To exemplify its position, this paper employed the risky sexuality data of Lagos-based international traders to explore the geo-transport perspective of the network concept in order to demonstrate its analytical utility. It examined the extent to which traders' act of engaging sexual partners at destinations varies among the regions of visit. It went further, using the sequential order of traders' trips to explore some novel but useful analyses on risky sexuality, including the monitoring and intervention potentials inherent in the matrix depiction of sexuality risk statistics of internationally mobile population groups.

Keywords: sexual networking, risky-sexuality, sexual matrix, mobile population, origin, destination

Introduction

The appearance of HIV/AIDS gave prominence to the idea of sexual networking both as conceptual and analytical tools for assessing patterns and dynamics of risky sexuality in a given population. As an analytical concept, sexual networking is a derivative of the social networking concept, which is employed in the analysis of diverse social relations. In addressing the question of sexuality risk via the concept of sexual networking, researchers employ two major sets of parameters to operationalise the risk elements in sexual intercourse. The first set of parameters consists of the bio-social attributes of sexual partners; which they employ to determine the extent to which the partners in a sexual intercourse crisscross biosocial divides to actualize a given sexual intercourse. Sexual interactions contracted across bio-social divides are assumed to portend greater degree of risk than sexual relationship that restricts intercourse to partners sharing similar bio-social identities. The second set of parameters focuses on the numerical attributes of sexual partnership and or sexual intercourse for sexually active individuals within a given population. Specifically, its interest is to determine the degree of sexual partnership formation as well as the intensity of sexual intercourse between partners in the studied sexual system. In this respect, sexual statistical attributes such as its frequency, its concentration (focus) and the number of partners are vital analytical parameters. Although the probability of contracting HIV/AIDS may not convey a linear relationship with the number of sexual occurrence between partners, it is generally held that high intensity of sexual activity in a population increases the chances of either fresh or re-infection in that population.

Indeed, the extant adaptation format of the social networking concept has enhanced analytical capabilities in risky-sexuality; it has however, not offered an exhaustive analytical purview for addressing every issue of interest on risky-sexuality, particularly when it involves spatially-mobile population in their different destinations. A survey of researches on sexual networking in this context shows that studies which employ the geo-transport analytical perspective of networking are rare to come by. This explains why sexual networking researches on mobile population groups have not benefitted much from the spatio-temporal application of the networking concept, despite the distinct analytical niche it offers at enriching the treatment of sexual behavior in the context of itinerancy. Indeed, any act of sexual transaction in which at least one of the intercourse partners is a non-resident at the intercourse location automatically creates a geo-transportation sexual problem, in which at least three dimensions of the resultant sexual events are amenable in varying degrees to one form of network analysis or the other. The first and the second dimensions amenable to network analysis respectively are the bio-social gaps between the sexual partners, as well as the numerical attributes of the resultant sexual intercourse and partnership. The third dimension quantifies specific attributes of risky-sex events in an interaction format between the origins of the mobile sexual partners and the

different destinations in which their sexual partners are domicile, using the interaction matrix technique. A comparison of the three dimensions shows that the first two, that is, the bio-social gap and numerical attributes of sexual relationships belong to a lower analytical hierarchy in contrast to the third, which examines the origin-destination dimension. In other word, while the first two dimensions analyze sexuality risk attributes only with respect to the partners involved, the third dimension collates obtained information at the lower levels to produce risk-differentiated matrices of sexual interactions between origins and destinations of such partners.

Adopting such an analytical purview widens the treatment of sexuality risk beyond the traditional approach and offers certain analytical and intervention-related benefits which are highlighted in the discussion. The number of researches employing this analytical perspective is very scanty. It is indeed doubtful whether previous analytical efforts on HIV/AIDS either as an inter-regional or international concern ever employed the matrix or pseudo-matrix method to analyze the risk-sexuality linkages of the mobile (guest) population and their (host) counterparts despite the description of migrants as 'bridges' (Ferguson and Morris, 2007) over sexual spaces. Such an oversight no doubt has limited the extent to which previous researches could have made useful contribution to the theory and interventions on sexuality risk involving mobile (guest) and local (host) populations groups at different destinations. This paper aims at filling part of the analytical perspectives gap on sexual networking, in the context of circulatory migration.

Aim and objectives

This paper explores a spatio-temporal analytical perspective of the sexual networking concept, using sexuality data of Lagos-based circulatory traders to show the utilitarian application of the matrix approach to the sexuality risk analysis of a mobile population. To achieve its goal the paper takes three sequentially related steps. First, it undertakes an incisive review of literature on the conceptual and operational treatments of sexual networking to date, to reveal the evident omission of the matrix-analytical perspective, particularly in the contexts where such analyses are very appropriate. Second, it outlines the method and the procedure involved in obtaining the primary sexuality data of the circulatory population that the present study employed to exemplify the matrix analysis. The paper then analyzes the trip engagements of circulators to regional destinations, as well as their accompanying events of risky sex. It thereafter collates previous sexual statistics into a global matrix of sexual transactions and then explores the analytical and policy relevance of the various analyses in the study.

Literature review and theoretical considerations

The slow response of bio-medical sciences to the threatening virulence of HIV/AIDS informed the shift of attention of health stakeholders towards Social Sciences which had sexual behavioural reorientation as its main goal. Its major task at the outset was to devise appropriate conceptual purview(s) and relevant analytical strategies which aptly capture the linkage between extant patterns and factors of HIV/AIDS' transmission, for appropriate interventions. One of the early and major responses which focus on sexual networking came from the Canberra School. The edited work of Orubuloye, Caldwell, Caldwell and Santow (1994) offers a glimpse of the state of the arts in analytic sexual networking during the early phase. A general assessment of contributions from Social Science at that time shows that two major themes and their analytical peculiarities dominated the research focus. The first theme focused on determining the degree to which studied communities or groups exhibit HIV/AIDS-vulnerable sexual practices. Almost simultaneously, research interest expanded to include the identification of sub-community groups; such as demographic and occupational groups that were noted for high risk sexual behaviour through case-study analysis. The design of analytical perspective on sexual behavior at that time in general excluded the theme of sexuality risk and spatial population mobility.

As research interest widened, two major analytical approaches crystallized and generally tend to dominate the treatment of sexual networking concept even up till now. The first approach operationalized sexual networking in terms of the numerical parameters of sexual relationship between a given pair of sexual partners and those with whom either of them might have had sex in or outside that community over defined periods. A variety of related quantitative parameters were generally employed by different researchers in many of those studies, including the life-time total sexual partners ever had, as well as varied time-specific number of sexual partner had by a given respondent. The analytical perspective to sexual networking in studies by Anderson (1988) Anderson et al.(1991), Caldwell and Caldwell (1993), Caldwell, Orubuloye and Caldwell (1992, 1994), Orubuloye, Caldwell and Caldwell

(1992, 1994a, 1994b) Adegbola, Babatola and Oni (1995), Adegbola and Babatola (1999) etc. fall into this category. The second set of analytical parameters employed by researchers to operationalize the sexual networking concept was the socio-demographic-cum-economic attributes of sexual partners. The purpose was to determine the extent to which sexual partners either crosses or remains within their respective socio-economic circles in contracting sexual partnership. It is expected that sexual infection in a given population will be minimal when sexual events are contracted by partners in similar socio-economic–cum demographic groups, than when done otherwise. Major operational parameters employed by researchers in their analysis include age, occupation, education, religion, ethnic differences between respondents and their serially-specified sexual partners over a specified period. Incidentally, many of the studies that utilized the numerical parameters in the assessment of the networking analysis also examined it in the context of the socio-economic-cum demographic parameters.

Generally speaking, the urge to widen the conceptual and analytical perspectives of sexuality-risk for mobile population groups in such a way that it reflects the spatio-temporal dynamics inherent in their sexual transactions has been very sluggish. Although Hunt's study (1989) on migrant labour and sexually transmitted diseases appeared at the close of the 80s; effectively, it was not until the early 90s that the import of population mobility on sexual networking and risk began to attract due attention. Despite the increasing interest of research in the connection between population mobility and sexuality risk, there was no significant change in the way the sexual networking concept was operationalized between the mobility-neutral sexual events of non-movers and the mobility-connected sexual transactions of their mobile population counterparts. In many of the studies carried out such as Jochelson, Mothibeli and Leger (1991), Anarfi (1992), Anarfi, Appiah, & Awusabo-Asare, (1997), Bansal (1992), Orubuloye, Caldwell and Caldwell (1992), Podhisita, Mawer, Pramualratana, Kanungsukkasem and MacNamara (1996), Jackson, Rakwar, Richardson et al. (1997), Marck(1999), Mukodzani, Mupemba and Marck(1999), and Mupemba (1999) the tendency was to employ the same analytical template used for non-migratory populations to depict and analyze sexual networking events of spatially mobile population groups.

The real cost of neglecting an appropriate analytical tool for studying the sexual behaviour of mobile groups has other implications on programme intervention and monitoring. It invariably affects, for example, the extent to which conceived or recommended HIV/AIDS interventions at inter-regional or international level reflect the spatio-temporal nature of migrants' sexuality. Indeed, both Gould (2004) and Deane, Parkhurst and Johnston (2010) seem to be raising this point, when they noted that gap exists between the capabilities of existing methodological tools for analyzing migrants' sexuality and the more applicable types which should reflect its inherent spatio-temporal essence as well as its potentials for interventions. In essence, a major improvement in the analytical treatment of sexual networking data of mobile population groups, especially in the mould canvassed by Gould and Dean et al may be obtained by taking cognizance of the three distinct components that may impact on migrants' sexuality, namely, the mover, the linkage and the destinations for at least three reasons. One, the nature and the degree of sexuality risk constituted by a given origin-specific mobile population to a given destinations is likely to differ from that constituted by another set of mobile population to the same or other sets of destinations. Two, the degrees of exposure to risky sexuality which characterize each of the linkages that connect a given origin with its array of destinations are not likely to be identical. However, whenever the transport linkage component is dominated by air travels rather than the long-haul road mode, the sexual vulnerability risk of the linkage component becomes negligible and may be disregarded. Three, the HIV/AIDS risk ratings of the diverse destinations visited by a given set of mobile population group are most likely to exhibit different levels of variations than perfect similarities.

A major advantage of the above conceptual and analytical perspectives is that it facilitates the analysis of sexual intercourse of a mobile population in the form of sexual matrix which conveys series of sexuality risk information respectively for the moving population, the linkage routes (where applicable); and the destinations. Moreover, the perspective offers a framework for determining the extent to which observed changes in the sexuality risk status of a destination may be ascribed to sexual liability risk constituted by each of the origins feeding it with circulatory migrants. Likewise, it provides a perspective through which the entire three-component sexual information system - that is, the sexual attributes of the migrant population from a given location, the sexuality-risk rating of the connecting transportation links, as well as the degree of sexuality risk that characterize each of its array of trip-end destinations – can be analyzed as a single matrix system of sexual events.

It is remarkable that the focus of Geographical Information's (GIS) analysis on sexual networking has overlooked this perspective. Indeed, much of GIS contribution to HIV/AIDS analysis centers on identifying regions of

differential HIV/AIDS concentrations to facilitate well-gauged interventions. An examination of a representative list of GIS studies on HIV/AIDS, such as Ferguson and Morris (2007), Tanser, et al, (2009); and Westercamp et al, (2010) reveals the dominance of two major issues of interest. The first identifies 'hotspots' of sexual intercourse and provide estimates of sex workers, while the second identifies clusters of risky sex and infection, both of which required no matrix-analytical format for their tasks. The highlighted analytical-perspective gap in sexual networking research, informs the focus of this paper which analyzes the sexuality risk data of Lagos international circulators to demonstrate the inherent utility of the matrix approach to the analysis of sexuality data of spatially mobile groups.

Data and Methods

The data for the present analysis originated from a multi-perspective research which compared numerous aspects of sexuality risk between mobile and immobile population groups in the context of international mobility. Details of the fieldwork procedure and rationales have been reported in Babatola (2011) and may be consulted for further clarifications. Only a summary of its essentials shall be highlighted here. Since the target respondents are traders, that are identifiable with specific market(s), the study employed the market location survey in preference for a metropolis-based sampling design. The study specified two major criteria that qualify a market for selection. (i) Records from initial pre-fieldwork survey must have indicated that a proportion of traders in that market travel outside Nigeria either to buy or sell their wares; (ii) A selected market must not be an appendage to a larger one to avoid a double listing of traders who have stalls in both markets, thereby artificially increasing its sample space. Four major markets made the list based on the selection criteria. They are, Balogun International Centre for Commerce (BICC), where diversified products are sold, including imported food, household durables, diverse equipments, gadgets etc; two, ASPADAM, an acronym for Auto Spares Dealers Association Market, devoted chiefly for sales of auto spares; three, Alaba International market (AI), Lagos' foremost market for electrical and electronic equipments; and Oyingbo White Sand Market where imported foodstuffs from the West African region are sold. The projected samples based on the indicated population of circulatory traders for the four markets are as follows. 367 traders out of 3172 traders in BICC; 24 of 208 circulators in ASPANDAM; 58 of the 500 Alabama International traders and 29 of 270 traders in Oyingbo market. A circulatory trader is defined as a trader who had travelled outside Nigeria solely on commercial purpose at least once. From the outset, the lower and the upper limit targets of the sample size were fixed at 400 and 500 respondents respectively. At the completion of the exercise, a total of 450 questionnaires were found in varying degrees to be reasonably acceptable for analysis.

The fieldwork: The fieldwork was strategically fixed between December and March, a period when most circulatory traders minimize travels to benefit from massive sales at home driven by the accompanying Christian festivals**.** The strategy ensured that those that were randomly selected, but who had travelled at the beginning would have returned for questionnaire administration before the end of the exercise. Notwithstanding the arrangement, persistent absence in a number of cases led to the original samples being replaced by the available ones. The actual fieldwork exercise involved the following sequential steps: (i) Establishing contact with market leaders for briefing and support (ii) Generating the list of shops in which the circulation status of the owner is listed as part of the shop's identity; (iii) construction of separate sample frames from which the respondent samples were drawn. This was done by first writing the number of individual stalls on paper slips, folded and poured into a container from which the numbers of pre-determined samples were randomly selected.

Instrument and Analysis: The administered questionnaire solicited information from respondents on a wide range of issues, which include: socio-demographic and business/economic profiles, domestic and international sexual history and trade-related travel experience. Analysis of the socio-economic and demographic attributes of the population employed the frequency analytical method. Results of the other tables were obtained through series of cross-tabulation procedure. Respondents among others were asked questions on the last seven international trips they have made apart from their very first international trips outside Nigeria. Series of other information about each destination were inquired. Notable among them are: the year of the trip, the duration of stay, accommodation used, whether the respondent had a spouse in such destination, etc., Response to three of such questions, namely, one's indicated marital status, the stated number of spouses, and whether one has a spouse in each of the visited destinations or not, provided the basis for determining whether an acknowledged sexual intercourse at a given destination is risky or not.

Matrix analysis of sexuality: The matrix analytical technique is employed to highlight the connective as well as the sequential elements inherent in the concept of network, which have been missing in sexual networking literature. It is

applied in a unidirectional manner in which Lagos functions as the only origin and other regions of the world as recipients of streams of its human circulators. Among others, it is to show its unique analytical appropriateness for analyzing sexual networking problem, when the emphasis is to reflect the inherent spatial or temporal linkages without necessarily employing a map. Given the fact that the number of destinations visited by circulators was quite large and the frequency of visits varying widely, the study collapsed trip destinations into global regions for improved manageability. Altogether, eight regions emerged from the grouping exercise, namely, Western Africa, Mid/Cent Africa, Eastern Africa, Southern Africa, Northern Africa, Europe, Asia and South/North Americas. The first matrix analysis compares the relative volumes of circulator-trips originating in Lagos that are attracted to specific regions of the world, and the percentage of such circulator-trips that engaged in risky sexuality. The second type of network analysis defines the trips in terms of the sequential pattern of circulators' trips from a minimum of 1 to a maximum of 7 trips. Two reasons informed the choice of sequential order rather than for example the year of occurrence. First, the year in which individuals make their first, or second or nth trip may vary widely and may not really be as important as the order of a trip in terms of its likelihood to associate with risky sex. The argument is that the degree of socialization or the individual's perimeter of social network will most likely get wider as the number of trips increases. Hence, the sequential arrangement of trips may offer a useful analytical paradigm for assessing whether sexuality risk increases or reduces with increase in circulators' sequential order of trips.

To generate the matrix format of sexuality risk, the study employed the **SPSS crosstabs** procedure to analyze responses to the question on whether or not a respondent had sexual intercourse in each of the indicated trip(s). Given that the same set of questions were asked for each of the destinations visited by a given trader, the crosstabs procedure helps to monitor changes in any of the risky-sexuality attributes analyzed between a given trip or destination and each of the subsequent ones. For example, a cross-tabulation of whether a trader had sexual partner at the first destination/trip with same question for the second destination/trip, will produce four subsets of respondent groups: namely, those who had sex at the first trip and also had it at the second trip; those who had it at the first trip but did not do so at the second trip; those who did not have it in the first trip but had it at the second trip; and those who did not have it respectively during the first and second trips. In essence, differences in the degree of occurrence of any of the studied sexual events between a given pair of non-identical trips may be obtained using the cross-tabulation procedure. In the current analysis, four major research questions were posed and resolved. One, what are the basic socio-economic attributes of the circulatory population focused upon in the present study; two, what is the regional pattern of international travel and sexuality risk that characterize trips to the different regions defined for the present study; and what relationship exist between the sequential order of trips and their degree of inherent risk; and; what benefits does the matrix analytical approach offers the treatment of sexual networking in the context of existing literature.

Results

Table 1 below highlights the essential socio–economic and circulation attributes of the study population. Majority of traders that engage in circulatory trade are males. Two major reasons account for this near-monopoly by males. First, majority of **(Table 1 is here)** traders in this category of commerce both in Lagos and in other cities in Nigeria, belong to the Igbo ethnic group, among whom the male dominates certain genres of trade; particularly trade and commerce involving high net-worth value. Second, given that international commercial circulation often involves periodic absence from home, the involvement of a large proportion of female may endanger their marital stability. The Mean age value of 36.3 years is reliable given its proximity to the Median age value of 36 years. Those in the 30-49 age brackets constitute the largest group, accounting for 80% of traders. The oldest of the three groups, that is, those that are 50 years and upward constitutes 2.8%. The marital status of traders reflects the age pattern, as 59.1% of sampled traders are married, while 39.3% are single. The remaining 1.6% consists of others who are either widowed, separated or divorce. Religious affiliation shows that majority of the traders are Christians (96.2%). Only about 3.8% claimed not to be Christians, who are mainly Muslim. Denominational membership of the Christians shows the Protestants are in the majority (35.8%). The proportions of the Catholic (29.6%) and the Pentecostals (29.8%) appear to be converging. Education analysis shows that the Primary Six/Full Secondary group is in the majority (48%). They are followed by those in the 'None/Incomplete Primary group (27.3%). Those with Post secondary/Tertiary group account for 22.4% of the sample. Regional origin shows that the majority (91.9%) of the traders originate from states from the South East region of Nigeria the heartland of the Igbo group. States from the South West, which includes Lagos account for 5%, while the others, which include the middle belt and the north

account for the remaining 3%. Duration in business shows that majority (48.1%) has had between 12 and 32 years of continuous business experience. That group is followed by those who have had 8 – 11 years of business experience, and finally by those who have been in business for 1–7 years, being 21.2% of the traders

The modal percentage (39.8%) of the traders has spent between 16 and 40 years in Lagos. Next to that group are those who have resided in Lagos between 10 and 15 years (28.2 years). Those who had stayed between 1 and 9 years constitute 19.5%, while those that were born in Lagos were 12.4%. The net-worth of their invested capital shows that 42.2% have investment which exceeds ₦1.00 million in value; while less than a third operated in the ₦0.5 to ₦1.0 million investment brackets. The least investment brackets, that is, those whose business worth is below ₦0.5million constitute 28.2%.

Temporal Pattern of International Trips

Table 2 shows the records of the series of trips undertaken by the traders. The records show that 96.7% (434) could recollect the exact first year of their first international commercial trip. About 1.8% of that number made their first trips on or before 1984. The percentage rose to 6.8% and 9.5% respectively in the two succeeding eras that is 1985 - 1989 and 1990 – 1994. Further increases occurred between 1995 and 1999 and also between 2000 and 2004 respectively. Specifically over half of the first-ever trips (57.5%) were made between 2000 and 2004. The temporal structure of the second trip series is basically a reflection of the first trip pattern; except for the greater degree of skewness of trip which took place after the year 2000. A clear picture which emerged from the sequential pattern of trips is that international circulation in trading activities started long ago prior to the emergence of HIV/AIDS as an issue of major health concern. The proportion of traders that had their first-ever international commerce-related trip was a bare 1.8% up to 1984. Significant increases began between 1985 and 1989, when 7.1% and 2.2% respectively of first- and second-trip makers respectively travelled to their destinations. Furthermore, the general tendency for the proportions of traders that travel at a particular time to be higher than the proportion that travelled during the period which preceded it, suggests that the phenomenon of international travels by traders may continue to increase further in future. The relevant question from the observation is what does the observed temporal pattern translate to in terms of the risky-sexuality occurrences in the different global destinations. This next section addresses that question. (Table 2 here)

Pattern of sexuality risk among international regional destinations

Table 3 shows the pattern of sexual intercourse involvement by traders across the different regional destinations. For a start, the West Africa region has the lion share (44.1%) of Lagos-outbound traders. It is followed by Asian destinations (28.1%). Besides these two, only Europe (9.5%) and North Africa (9.2%) came close to achieving a ten percent visitor (traffic) level. Altogether, the entire African sub-regions attracted about 60.2% of the entire out-bound trading-trips generated in Lagos. Other regions of the world shared the remaining 39.8% traffic. Although the table presents a trip by trip analysis of the traders' trips and their risky sexual outcomes, the cumulative summaries of the travel and sexuality patterns offer a much more reliable assessment of the true situations for both variables. The percentage of West African-bound traders who had **(Table 3 here**) sexual intercourse in their destinations, disregarding the order of trips varied from 12.5% (6^{th} trip) to 25.8% (1^{st} trip) and 50% (7^{th} trip). For Asia, they were respectively, 0.0% (5^{th} and 7^{th} trips) to 50% at the 6^{th} trip. Similar patterns of wide fluctuations characterize other regions in varying degrees. Such patterns of wide fluctuations suggest that the mean summaries of travel and sexual variables are better parameters for comparative assessment. Given that understanding, the risk-sexuality outcomes in the Central/Mid Africa which involved 73.3% of Lagos-outbound travellers to that region represents the highest. Next to that is 'the Americas' (52.0%), Southern Africa (36.8%); Europe (30.6%); East Africa (29.6%), North Africa (28.0%), West Africa (27.5%) and Asia (26.0%). Further comparative analysis using the total mean percentage value of risky-sex involvement for all regions, which stood at 28.9%, shows that three regional destinations, namely, 'North Africa' (28.0%), West Africa (27.5%) and Asia (26.0%) exhibit risky-sexuality percentage values below the aggregate mean. The regional pattern above emphasizes disparities in the incidence of sexuality risk among the study regions and its implication on regional monitoring and intervention. The next section examines the other dimension of risky sexuality. It examines how stipulated risk sexuality events varied in between trips, depicted in the form of inter-trip matrices to explore its analytical benefit.

Dimensions of Risky Sexuality by Trip Sequence

Table 4 explores specific dimensions of risky sexuality by trip sequence. It is to determine whether or not differences in the sequential order of trips impacts on their risky sex attributes. The table in essence displays in a matrix format changes in three statistical attributes of risky-sex by circulators for the entire 7 trips. The procedure for the analysis of the sexuality matrix involves taking a given trip, say trip 2, and examine the nature of changes which occurred in the specified parameters of risky sex between that trip and the immediate precedent trip. Structurally, the information in the matrix can be grouped into two. The first set of entries, which are displayed in emboldened fonts show changes between any two trips that are consecutively related; such as between trip 1 and trip 2, or trip 3 and trip 4 and so on till trips 6 and 7. The 6 matrix cells which produce such consecutive relationships are shown in emboldened entries. The second set of value entries in the matrix record changes that occurred in sexual transaction information between any two trips that are not consecutively related; such as between trips 1 and 3 or 2 and 4 etc. This set constitutes the remaining 15 matrix cell entries in the system. The specific sexual parameters or information analyzed in any complete matrix is a function of the set of specified objective(s) for the study. The present matrix analyzes the degree of changes in three dimensions of risky sexuality, namely, the proportion of those who had sexual intercourse in their last and the current trip; the proportion of circulators that refrained from (Table 4 here) sexual intercourse in the last trip but had it in the current trip; and, third, the proportion of those who had sexual intercourse in the previous and the current trips, and did so also at the same destination. The entries in essence reflect the changes in a specific measurable attributes of sexual transactions of the mobile traders between each conceivable pair of trips in the matrix.

Accordingly, the set of value entries in the matrix table show changes in such attributes of sexuality risk between a given trip, such as between trip 1 (Row 1) and trip 2 (Column 2). The first of the three pairs of values in each of the row by column intersection points signifies the number of circulators who had sexual partners in their previous n^{th} trip and also had one in the current (n^{th} +1) trip. The value is expressed in the parenthesis as a percentage of all those who had sexual intercourse in the previous trip. The pair of values in the middle slot shows the size and the proportion of circulators who did not have sexual partner in the previous trip, but now have one in the current trip. The value is also expressed in the parenthesis as a percentage of those who did not have sexual intercourse at the previous trip. They represent fresh 'converts' to the number to those who had sexual intercourse in the previous trips. The figure in the corresponding parenthesis expresses these additional entrants as a percentage of those who did not engage in sexual intercourse in the trip that preceded the current one. The pattern of variations in the value of this variable across series of trips could serve as an indicator of the effectiveness of an intervention programmes focusing on a mobile population group over a specified period.

The last of the three pairs of the value entries shows those, who not only had sexual transactions in the last and current trips, but did so in the same destination. Thus, 60.2 per cent of those who had sexual intercourse during their first trip also had sexual partners during their second trip. By contrast, 13:4 per cent of circulators who refrained from contracting sexual partners during their first trip engaged a sexual partner during their second trip. Of the 65 circulators who had sex during their first and the second trips, 4 (6.15%) of them did so at the same destination. Generally speaking, the degree of variations in the values of those who engaged in sexual intercourse between two consecutive trips appears rather high and stable. With the exception of the 4^{th} and 6^{th} trips, when the values of repeated committal were 48.7% and 33.3% respectively, the other inter-trip or cross-over committal levels varied between 50% (7^{th} trip) and 75% (5^{th} trip). By contrast, the percentages of new entrants for each pair of consecutive trips were generally lower than those involved in cross-over committal. The lowest value was 6.9% between the 4^{th} and the 5^{th} trips, while the largest value was 14.5% between the 3^{rd} and the 4^{th} trips. Secondly, 16 of the total 21 trip interactions in the network, which is approximately 76.2%, contains 'new entrants', who had no sexual intercourse during a preceding trip, but did so at a subsequent trip; while 9 or 42.9% of the matrix entries document intercourse events in which the precedent and the subsequent destinations are identical. A number of analytical possibilities are offered by the matrix analytical perspective, which shall be further highlighted under the discussion.

Discussion: This study set out to highlight the existing oversight in the analytical paradigms employed so far in the treatment of sexuality data of mobile population groups vis-à-vis the more inclusive perspectives which incorporate the spatio-temporal attributes of sexual transactions. It observed that the analytical perspectives employed in the treatment of sexual networking at its inception, when the import of population mobility on sexuality-risk had not gained much prominence, still retained its domineering posture, despite the realization of the need to improve on the

approach to mobility-related sexuality analysis. It argued that risky sex in the context of population mobility is conditioned by the sexuality risk attributes both of the mobile individual and the locally-domicile partner, which may differ remarkably depending on their individual and or respective communities' sexuality-risk correlates, besides the variable likelihoods of risk along the connecting routes. It then argued the need to widen the current perspective on mobility-related sexuality risk analysis, in order to improve on the degree to which they reflect the spatio-temporal dimension of sexuality risk, particularly to enhance their intervention relevance in that context.

The paper employed the sexuality data of Lagos-based international traders to exemplify the existing analytical gap. The socio-demographic analysis of the sampled traders shows some interesting patterns among which are, the dominance of traders of Igbo ethnic origin than non-Igbo traders combined; male traders' domination; of married folks surpassing the single traders; and of the preponderance of supra-millionaire investors than lesser-worth investors. The paper explores in three tables the two primary dimensions of sexual networking concept which reflects the geo-transport analytical perspective. The first analysis examined the pattern of circulators' trips to categorized regions of global destinations. Results among others show that although business trips started before the 80s, remarkable increases in the volume of travels at the aggregate-trip level occurred respectively in the periods 1990 to 1994 (6.6%), 1995 to 1999 (16.9%) and 2000 to 2004 (72.7%), with varying degrees of deviations at the individual trip level. The temporal analysis of travel shows that sizable proportions of the sequentially arranged trips - varying from 19.4% (4^{th} trip) to 42.5% (1^{st} trip) had occurred by 1999; the year when HIV/AIDS prevalence level attained the critical 5% level in Nigeria. The comparative analysis of sexual intercourse event outside Nigeria show sharper differentiation among destinations than among trips. For example, while the highest risky sexual transaction of 31.5% occurred among the first-time travellers, in contrast to a minimum of 20% by the seventh trip makers, the maximum degree of sexual transaction on regional basis occurred in Central/Mid/Africa destinations (73.30%) compared to the lowest committal level of 26.0% in Asia. The overall picture from the destination analysis shows that for the entire period covered by this study, besides the Central/Mid/Africa destinations, other regions with higher percentage values of risky sexual transactions are S/N/American destinations (52%), Southern Africa (36.8%), Europe (30.6%) and East Africa (29.6%).

A major benefit inherent in analyzing sexual networking by its origin-destination format is the capability it offers for fine tuning intervention programmes so that they can reflect the differential risk burden constituted by the mobile population from a given origin to the set of destinations they travel to whether at the local or the global scale. This implies that international interventions targeted at moderating risky sexuality would profit better if designed with the recognition that different origins may impact different degrees of risk burden in the degree of sexuality risk constituted by a given group of mobile (guest) population at a given destination in contrast to the degree of risk that the same or a comparable group constitutes at other destinations. The implication is that intervention must come up with HIV/AIDS strategies which place high premium on the differential likelihoods of different origins or destinations constituting different degrees of sexuality risks to the success of intervention. The second dimension examines sexual networking in the context of sequential arrangement of trips, given the apparent connection between the number of trips and the degree of social networking on one hand, and the implication of that relationship on the chances of sexual intercourse by circulators at trip destinations. Specifically, it expresses circulators international sexual events in terms of how they vary between pairs of trips and to some extent, the degree of same destination intercourse committal to explore the inherent utility of such analysis for sexual intervention programme. The first obvious benefit is the versatility of the trip sequence in matrix format to analyze specific parameters of risk sexuality that may be of interest at more than one level of characterization. In this paper, the sequential trip matrix analysis characterized the committal of risky sex by circulators in three ways. First, committal of sexual intercourse at previous and current trips; second, no-sex in the previous trip but had in the current trip (new entrants); and third, previous and current trips committal that converge at the same destination.

Besides the specific analysis that has been demonstrated in the current paper, the trip sequential analysis offers wider and dynamic approach for assessing sexual networking of a mobile population in the context of their spatial peculiarities. First, in the context of a longitudinal analysis, two sequential trip-cum-sexual networking matrices may be computed for a given origin to compare how its mobile populations have adjusted on the committal of risky sexuality in the various destinations patronized by them between two consecutive periods. The present study has computed only one sexual matrix for Lagos as origin. Alternatively, duration-specific separate sexual interaction matrices may be computed for two or more origins to determining the nature and the degree of constraints posed by such origins to the realization of the regional intervention targets on risky-sexuality reduction. Furthermore, the

number of occurrence of each of the computed risk-sexuality parameters, for example, say the number as well as the degree of occurrence of risk-sexuality event between 2 consecutive trips, may be expressed as a ratio of the total number of entries (N) in a given trip sequential sexuality matrix. The results obtained from such computations when compared with similar ratios computed for other sets of origin-destination sexuality matrix, provides the measure of relative sexual interaction liability which the specific origins constitute to their respective destinations; controlling for time coverage differences among the data sets. Such results in the context of interregional/international sexual behaviour intervention programme provide a means of specifying the nature and the magnitude of the risk-sexuality challenges confronting sexual behavioural intervention programme between specified origins and their respective destinations.

Conclusion

Attempts to date at studying human sexual behaviour in the context HIV/AIDS vulnerability has to a large extent adapted the concept of social networking to capture and highlight patterns and correlates of risky sexuality in different population contexts. The perspectives of its adaptation have been less inclusive than possible. The lack of significant application of the geo-transport perspective of networking is noticeable, despite the peculiar niche it offers the multi-dimensional analyses of sexual events involving mobile (guests) and immobile (hosts) sexual partners, in the context of interaction between specific origins and their respective destinations. The poor exploration of the geo-transport perspectives has restricted achievable progress by limiting the nature of emerging questions in at least two major areas of sexuality research, the resolution of which would have benefited both theory and international intervention clues on HIV/AIDS in diverse ways.

First, research has not explored the connection between trip sequence and inclinations for different sexuality risk practices. For example, there is a need to widely explore whether or not increasing trip frequency to a destination associates significantly with greater tendencies for risky sexuality; given the logical assumption of the widening effect of multiplied trips on the social networking fields of a mobile population. Further extension of such a research inquiry for example, would help to clarify on whether any observed relationship between the two variables are liable to the moderating influence of the cultural similarities or differences between specified origins and their respective destinations. Second, researches have generally overlooked to analyze the extent to which the degree of risk constituted by mobile populations say, from a given country to its different destinations, could be apportioned to either of the two areas respectively. A clear resolution of such and related questions offer great potentials for example in the formulation of international policy which tend to control HIV/AIDS between specific countries and the rest of the world. It would, for example, enable a given country to categorize individual countries according to the degree of risk which their emigrants constitute to its domicile population; not based only on the reported sero-prevalence of such origins, but on the documented level of vulnerable sexual transactions between such emigrants and its own local populations. The expansive and intervention relevance of geo-transport perspectives of network analysis suggests its greater application to sexuality research in the context of spatial population mobility than hitherto.

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TABLES

Table 1: Selected Socio-Demographic and Economic Attributes of the sampled Population

Selected Variables		Distribution No (%)	Selected Variables	Distribution [No (%)]
SEX:	Male	395 (89.6)	**REGION OF ORIGIN**	
	Female	46 (10.4)	S/East	408 (91.9)
AGE:	20-29	73 (16.8)	S/West	22 (5.0)
	30-49	349 (80.4)	Others	14 (3.1)
	50+	12(92.8)	**NO OF YEARS IN BUSINESS**	
	Mean/Median	36.3/36	1-7yrs	95 (21.2)
MARITAL STATUS:	Single	177 (39.3)	8-11yrs	138 (30.7)
	Married	266 (59.1)	12-32yrs	216 (48.1)
	Others	7 (1.6)	**YEARS OF DOMICILE IN LAGOS**	
RELIGION/DENOMINATION			Born in Lagos	56 (12.4)
	Christians	433 (96.2)	0-9yrs	88 (19.5)
	Non-Christians	17 (3.8)	127 (28.2)	16-40yrs
	Protestants	161 (35.8)	10-15yrs	179 (39.8)
	Pentecostal	134 (29.8)	**SIZE OF INVESTED CAPITAL**	
	Catholic	133 (29.6)	Less than ₦0.5m	124 (28.2)
		22 (4.8)	₦0.5m – ₦1.0m	131 (29.7)
Unspecified			Above ₦1.om	186 (42.2)
HIGHEST EDUCATION			**1ST INTERNATIONAL TRIP YEAR**	
None/Incomplete Primary		123 (27.3)	Before or in 1984	16 (3.7)
Pry6/Full Secondary		216 (48.0)	1985 – 1994	128 (34.9)
Post secondary/Tertiary		101 (22.4)	1995 +	289 (61.4)
Unspecified		10 (2.3		

Table 2 Sequential Pattern of International Trips by duration

Trip sequence	% of sequential trips by duration: Up to 1984	1985-1989	1990-1994	1995-1999	2000-2004	Total
1ST Trip	8 (1.8)	31 (7.1)	41 (9.5)	105 (24.1)	250 (57.5)	435 (35.2)
2ND Trip	-	8 (2.2)	20 (5.5)	56 (15.2)	284 (77.2)	368 (28.9)
3RD Trip	-	-	14 (5.1)	29 (10.6)	236 (84.6)	279 (21.97)
4TH Trip	-	-	3 (2.9)	18(14.5)	85 (82.6)	106 (8.3)
5TH Trip	-	-	4 (8.5)	5 (10.6)	38(80.8)	47 (3.7)
6TH Tri	-	-	1 (4.2)	2 (8.3)	21 (87.5)	24(1.9)
7TH Trip	-	-	1 (9.1)	-	10 (91.9)	11(0.87)
Total	8 (0.6)	39 (3.07)	84 (6.6)	215 (16.9)	924 (72.7)	1270

Table 3 Regional destinations and sexual intercourse by trips

Trips Sequence	Regional destinations and sexuality-risk activity: West Africa	Central/ Mid Africa	East Africa	Southern Africa	North Africa	Asia	Europe	S/N America	Total/Mean (%) of sex Committal	Totals Trips (each trip)
1ST Trip	47 (25.8)[a]	9 (90)	2 (28.6)	8 (53.3)	6 (30)	33 (30)	10 (34.5)	4 (80)	119 (31.5)	378 (32.5)[c]
2ND Trip	44 (27.8)	1 (50.0)	3 (33.3)	4 (28.6)	11 (35.5)	23 (26.7)	7 (20.0)	4 (66.7)	97 (28.4)	341 (29.3)
3RD Trip	32 (28.8)	1 (50.0)	1 (25.0)	1 (20)	8 (30.8)	19 (22.4)	12 (42.9)	2 (40.0)	76 (29.6)	266 (28.6)
4TH Trip	10 (29.4)	0 (0)	1 (100)	1 (33.3)	2 (12.5)	8 (25.8)	3 (42.9)	3 (42.9)	28 (28.0)	100 (8.6)
5TH Trip	6 (35.3)	-	1 (33.3)	-	2 (22.2)	0 (0)	1 (20.0)	0 (0)	10 (23.3)	43 (3.7)
6TH Tri	1 (12.5)	-	0 (0)	0 (0)	0 (0)	2 (50)	1 (20.0)	0 (0)	4 (16.7)	24 (2.1)
7TH Trip	1 (50.0)	-	0 (0)	-	1 (50.0)	0 (0)	0 (0)	-	2 (20.0)	10 (0.9)
Mean ((/%) committal	141 [b] (27.5)	11 (73.3)	8 (29.6)	14 (36.8)	30 (28.0)	85 (26.0)	34 (30.6)	13 (52.0)	336 (28.9)	1162
Trip total (all egions)	512 (44.1)[c]	15 (1.3)	27 (2.3)	38 (3.3)	107 (9.2)	327 (28.1)	111 (9.5)	25 (2.1)		1162

[a] The main entries and their parentheses (e.g.47 (25.8%)) indicate that 47 of Lagos out-bound traders to West Africa, which is 25.8% of travellers on their first-time-ever trip to that region had sexual intercourse there. [b] Entries in the Mean committal row (e.g. 141 (27.5%)) indicates that 141 trips equivalent to 27.5% of the 512 trips attracted to West African destinations engaged in sexual intercourse in those destinations.

[c] Entries under Trip total, either for each region (column-wise) or for each trip (row-wise) show the volume of trader-trips attracted to a given region or the volume accounted for by each of the given trips respectively. The values in the bracket express them as % of total trips (N= 1162).

Table 4: Matrix Depiction of Sexual Transactions by Trip Sequence

Between trip	**Trip sequence**											
1	**2**		**3**		**4**		**5**		**6**		**7**	
1	**65[a]** **31[b]** **4[c]**	**(60.2)** **(13.4)** **(6.15)**	45 27 2	(50.0) (15.7) (4.4)	18 10 0	(45.7) (15.4)	8 6 1	(44.4) (22.2) (1.2)	2 2 0	(20.0) (14.3)	2 0 0	(50.0) -
2	- -		**53** **20** **7**	**(62.4)** **(11.2)** **(13.2)**	17 10 2	(50) (11.8)	7 7 1	(46.0) (22.3) (1.2)	3 1 0	(37.5) (6.3)	2 0 0	(50)
3	-		-		**19** **9** **3**	**(48.7)** **(14.5)** **(15.8)**	8 6 0	(38.1) (25)	3 1 1	(30) (7.7) (33.3)	2 0 0	(50) -
4	-		-		-		**12** **2** **0**	**(75)** **(6.9)**	4 0 1	(57.1) - (25)	1 1 0	(33.3) (14.3)
5	-		-		-		-		**2** **2** **0**	**(33.3)** **(11.8)**	1 1 0	(50) (12.5)
6	-		-		-		-		-		**1** **1**	**(50)** **(12.5)**
7											**0**	

a = this entry refers to the number of circulators who had sex in the last trip and who also had sex in the current trip.

b = This entry refers to the number of circulators who never had sexual intercourse in the previous trip, but do so now.

c = The entry shows the size of those who besides having sex in the previous as well at the current trips, had the two committals at the same destination.

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