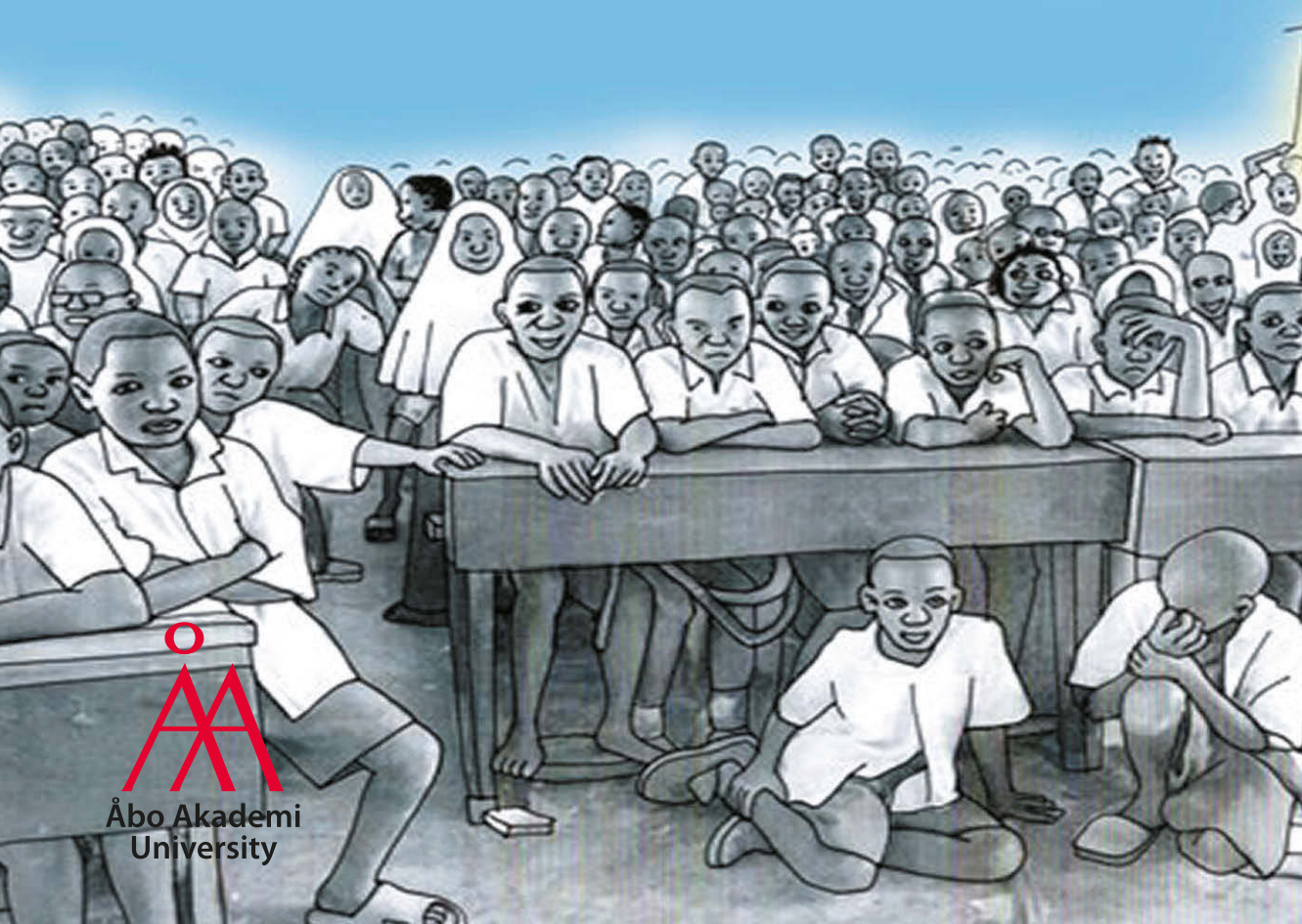


**Olusegun Makinde**

# **Overcrowding, Sleep Deprivation, and Infectious Diseases as Risk Factors for Aggressive and Antisocial Behaviour in Nigerian Adolescents**





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Cover picture by Tunbosun Ogundare



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Doctoral Dissertation

Developmental Psychology  
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## Abstract

The studies in the current thesis investigated the relationships between overcrowding, domestic aggression, and antisocial behaviour in adolescents in Ejigbo, Lagos, Nigeria (Study 1); domestic aggression and negativity in the home as mediators between overcrowding and antisocial behaviour in the same sample (Study 2); whether there were associations between how much adolescents slept per night and how much aggressive and antisocial behaviour they displayed and were exposed to, in the same sample (Study 3); and whether there is an association between the contraction of infectious diseases and peer aggression in a school context, in another sample of adolescents in Ejigbo, Lagos, Nigeria (Study 4).

*Study 1:* The objective was to investigate the relationships between overcrowding, domestic aggression, and antisocial behaviour in a sample of adolescents in Lagos metropolitan area, Nigeria. Possible sex differences and differences due to religious affiliation concerning domestic violence and antisocial behaviour were also investigated. A questionnaire was filled in by 238 Nigerian adolescents, 12–20 years of age; the sample included 122 females ( $M_{age} = 15.1$  years,  $SD = 2.0$ ) and 116 males ( $M_{age} = 15.8$  years,  $SD = 2.0$ ). The respondents were from junior and senior secondary schools in Ejigbo and surrounding cities (Isolo, Egbe, and Ago-Palace Lagos). Six scales were included: adolescents as victims of adult and sibling aggression, respectively, witnessing of domestic violence, parental negativity towards adolescents, antisocial behaviour among adolescents, and poverty in the home. Overcrowding, sex and religious affiliation served as independent variables. According to a multivariate analysis of variance with level of poverty as covariate, overcrowding showed significant associations with four of five scales measuring aggressive and antisocial behaviours. Sex and religion were associated with three variables each. However, multiple regression analyses revealed that overcrowding tended to partial out the effects of both sex and religion, showing that overcrowding was the most important factor determining negative outcomes.

*Study 2:* Due to the fact that an association between overcrowding and antisocial behavior among adolescents was found in Study 1, there was a need to investigate possible mediators between these two constructs. Study 2 was designed to explore whether overcrowding could lead to aggression and negativity in the home, which in turn could lead to antisocial behavior

outside of the home. The sample was the same as in Study 1. The data were analysed with the SPSS macro PROCESS with six scales as variables. Overcrowding served as the independent variable, anti-social behavior as the dependent variable, and parental negativity, adult aggression, sibling aggression and witnessing of domestic violence as mediators in a conditional process analysis. The results corroborated the hypothesis that the four mediators had an indirect effect on the antisocial behavior of the respondents. Accordingly, they mediated the effect of overcrowding in the home on antisocial behavior outside of the home.

*Study 3:* In the study, it was investigated whether there were associations between how much adolescents slept per night and how much aggressive and antisocial behaviour they displayed and were exposed to. The sample was the same as in Studies 1 and 2. It was found that the total sleeping time of the adolescents correlated negatively with five scales measuring adult aggression, sibling aggression, domestic violence, parental negativity, and antisocial behaviour. Thus, the less the adolescents slept, the more they were exposed to aggression and negativity, and they also themselves behaved more aggressively and antisocially. Participants living in overcrowded conditions slept less than others.

*Study 4:* In the study, it was investigated whether there is an association between the contraction of infectious diseases and peer aggression in a school context. The study was carried out among 284 adolescents (152 girls, 132 boys;  $M_{age} = 14.2$  years,  $SD = 1.7$ ) in Ejigbo, Lagos, Nigeria. It was measured how frequently the adolescents had contracted malaria, yellow fever, typhoid fever, and cough & flu. Both the perpetration of and victimization from peer aggression at school were measured with an adapted version of the Direct & Indirect Aggression Scales. The results showed a clear association between the contraction of all measured infectious diseases and peer aggression. It is suggested that it is not a question of cause and effect, but that a third factor, possible overcrowding, is a risk factor for both outcomes.

The results of these four studies have implications for housing policies in Nigeria. Moreover, these results may also have implications for research and policy making in other nations and parts of the world.

*Key words:* Overcrowding, adolescents, Nigeria, sleep deprivation, antisocial behaviour, aggression, infectious diseases

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*August 19, 2021*

*Olusegun Makinde*

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# List of Original Publications

## **Study I**

Makinde, O., Björkqvist, K., & Österman, K. (2016). Overcrowding as a risk factor for domestic violence and antisocial behaviour among adolescents in Ejigbo, Lagos, Nigeria. *Global Mental Health*, 3, e16, 1–9. doi:10.1017/gmh.2016.10

## **Study II**

Makinde, O., Björkqvist, K., & Österman, K. (2017). Mediating factors between overcrowding and adolescent antisocial behavior in Lagos, Nigeria. *Pyrex Journal of African Studies and Development*, 3, 24–30.

## **Study III**

Makinde, O., Österman, K., & Björkqvist, K. (2018). The association between sleep deprivation, aggression, and antisocial behavior in adolescents in Ejigbo, Lagos, Nigeria. *European Journal of Interdisciplinary Studies*, 10 (1), 154–158. doi: 10.26417/ejis.v10i1.p154-158

## **Study IV**

Makinde, O., Björkqvist, K., & Österman, K. (2020). The association between the contraction of infectious diseases and aggressive behavior at school: A study among adolescents in Ejigbo, Lagos, Nigeria. *European Journal of Social Science, Education and Research*, 7(1), 59–64.

## **Author Contribution**

The first author is responsible for the collection of all data, and for writing the main part of the text. The statistical analyses have been conducted jointly within the research group.



# 1. Introduction

## 1.1 Aim of the Study

The phenomenon of overcrowding within human populations is a surprisingly little researched area, although it is generally thought to have considerable negative concomitants of both psychological and physical nature. The four studies included in the current thesis were designed to bridge some of that gap. They focus on adolescents living in an extremely densely populated area, namely the suburban area of Ejigbo, southwest of Lagos, Nigeria. During adolescence, human development is very intense; the young person goes through a sensitive phase when social norms, rules, and customs are questioned and frequently also tested in search for one's own personality. A heightened sense of the need for privacy is often felt in order to successfully transgress into young adulthood. Adolescents are therefore a suitable research target.

The studies were conducted with paper-and-pencil questionnaires administered in schools. In Study 1, it was investigated to what extent respondents living in overcrowded homes had experienced the following five dependent variables in comparison with respondents living in less crowded conditions: (a) victimisation from an adult, (b) sibling aggression, (c) witnessing of domestic violence between family members, (d) being a recipient of parental negativity, and (e) antisocial behaviour displayed by the adolescents themselves outside of their home. In Study 2, it was investigated whether four of them (a, b, c, and d) served as mediators between overcrowding in the home and the outcome variable of antisocial behavior outside of the home. Studies 3 and 4 focused on two factors which often are related to overcrowding, namely sleep deprivation (Study 3) and exposure to contagious diseases (Study 4). Study 3 was based on the same sample as Studies 1 and 2, and it included the same dependent variables. Study 4 was based on another sample, and it measured the relationship between a variety of contagious diseases and peer aggression in the school context. In this study, it was not hypothesized that the diseases per se were the cause of the aggressiveness, but that a third variable, perhaps overcrowding, was the cause of both.

## 1.2 Overcrowding

The world population is growing at an alarming rate. It has been estimated that it will reach 9.7 billion in 2050, and that developing countries, specifically in Africa, will experience most of the growth (UN, 2019). Nigeria is the most populous country in Africa (New World Encyclopedia, 2015). It is also listed among the countries that are expected to account for the major part of the projected population increase in the world (UN, 2019). The capital city Lagos is extremely crowded; and the fastest growing large city in Africa (UN, 2019). In 2020, Lagos is the biggest city in Africa with over 14 million inhabitants (WPR, 2020). Overcrowding has been defined by the World Health Organization (WHO, 1999) in terms of average floor area per person. A more detailed definition provided by Eurostat (2014) is based on the number of persons per room. It also takes into consideration needs of children and adolescents, a group that is undeniably vulnerable in any overcrowded home or society. According to this definition, a household is considered overcrowded if there is not at least one room per two adolescents of the same gender 12–17 years of age and at least one room per two children under the age of 12.

## 1.3 Overcrowding in Nigeria

Overcrowding is the norm in Nigeria. Poverty and less access to quality education; Nigerians have lost interest in their government and due to this most legislation are neither known nor being followed by majority of the population. Besides, neither the Nigerian constitution nor any other legislation has made provisions about overcrowding among households in Nigeria. Overcrowding in the Nigerian context means that an excessive number of people (children, teenagers, and adults) live together in single room apartments, known informally as 'face-to-face' apartments, where living conditions are awful and occupants are unable to sleep well due to poor ventilation. There usually is poor hygiene and sanitation and a lack of basic household amenities. This typical type of building usually occupies an area of 12×15 m<sup>2</sup>. It is divided in the middle by a corridor with four rooms on each side. One such building is the home to eight families with an average of six people living in one room of 18 m<sup>2</sup>. One common latrine and a tiny bathroom are situated outside the building. Food is often prepared on the corridor, and windows cannot be opened due to security risks. For a detailed description of layout and morphology of this type, of housing, see Akinwolemiwa and Gwilliam (2014).

## 1.4 Lagos Metropolitan Area

In a study from the area of metropolitan Lagos, it was found that 77% of the randomly selected respondents lived in houses where 5–10 people shared the same sleeping room (Adeyemi, Waziri, Atere, & Emmanuel, 2009). Crowding in Lagos is the result of factors such as a low standard of living, migration to find a means of survival, and religious and culturally dependent attitudes emanating from having many children to help out with agricultural livelihoods. People in overcrowded communities are commonly also illiterate and do not have information about birth control.

In Lagos, people live in various types of houses, apartments and rooms. The worst and most unthinkable ways of living also exist, such as living in shanties, abandoned or uncompleted buildings, inside or close to rubbish dumps, under bridges and in suburban streets. These people still live, work and go about their normal activities like every other person in the community.

Although the government makes efforts to demolish uninhabitable homes and slums, they continue to spring up in different parts of the city. Despite the fact that the financial ability to relocate people into normal housing is available, the issue of corruption has been an impediment in this matter, so that these uninhabitable so-called ‘homes’ are found in every town, city and village in the country. Moreover, legislation to control immigration is not available and people from all walks of life rush into Lagos city on a daily basis, especially residents from the neighbouring countries such as Benin, Togo, and Niger.

## 1.5 Ejigbo Community and Its People

The town of Ejigbo is a suburban area southwest of Lagos, known for its dense population. Most people are residents, although Ejigbo also functions as a transit point to other parts of Lagos. As people living in Ejigbo derive their income from outside the town, moving into or out of Ejigbo is a problem, especially during the morning and evening rush hours. A normal morning in the town begins at about 04:30–05:00 am, and the day usually ends between 01 and 02 am. The question that might come to mind is whether the population ever sleeps at all.

The majority of buildings in Ejigbo are usually built without standard architectural layout or planning. This often contributes to flooding and drainage problems. Frequently, deficient buildings have to be demolished by the government. Some buildings are so dilapidated that one might

suppose they are used to shelter animals. However, that does not deter people from living in them and even renting them out to others.

## 1.6 Concomitants of Overcrowding

A review of the literature shows associations between overcrowding and a variety of both physical and psychological poor health outcomes (Gray, 2001). Although a number of studies have indicated a link between overcrowding and aggression (Dunstan, 1979; Regoeczi, 2008; Baum & Paulus 1991; Adegoke, 2014; Hotwani & Tripathi, 2017), limited research has been done with overcrowding and aggressive behaviours in domestic settings. Gove, Hughes, and Galle (1979) found that crowding was strongly related to poor social relationships in the home. A review, specifically concerned with children's health, concluded that in the case of children, crowding is shown to be associated with stress, poor educational outcomes and behavioural problems at school (Evans, Lepore, Shejwal, & Palsane, 1998).

A negative impact of overcrowding on the health of city dwellers in Nigeria has been reported by Ahianba, Dimuna, and Okogun (2008). In another study, in which associations between crowding and aggressive and antisocial behaviours in children was studied in a sample of Nigerian elementary school boys, it was found that significantly more aggressive boys came from crowded homes as compared with pro-social boys (Ani & Grantham-McGregor, 1998).

## 1.7 Child Abuse and Domestic Violence in Nigeria

Nigeria has ratified the UN Convention on the Rights of the Child (UN General Assembly, 1989) as well as the African Union Charter on the Rights and the Welfare of the Child (African Commission on Human and Peoples' Rights, 1990), and the principles have been promulgated into law in 24 out of 36 Nigerian states (UNICEF, 2013). Still, child abuse is usually not recognised in the Nigerian society, and little attention is given to it due to other major paediatric problems (Chinawa, Aronu, Chukwu, & Obu, 2014; Okeahialam, 1984; Wilson-Oyelaran, 1989). There is also a scarcity of scientific publications regarding the prevalence of child physical abuse in Nigeria, whereas other forms of child abuse, such as sexual, are more frequently reported (Uzodimma, Ogundeyi, Dedeké, & Owolabi, 2013). Physical abuse of children is also frequent in schools in Nigeria. A number of children have even been reported to have been flogged to death by their teachers (Chianu, 2000).

Domestic violence against women is common in Nigeria. In an article presenting gender-based violence in Nigeria, Ifemeje (2012) described how women and girls often are victims of the utmost cruelty in their own families. The local culture also supports violence against women. In 2013, wife-beating was accepted by 35% of the women in a national survey. This was however a decline from 2008, when it was accepted by 43% (National Population Commission, 2014).

### 1.8 Witnessing of Domestic Violence

Although most domestic violence is taking place between parents, children are present as witnesses, and they might not be able to explain or understand what the violence is all about (Straus & Gelles, 1990). If children frequently are witnessing domestic violence, especially at an early age, it is associated with high levels of aggression, anxiety, hopelessness, a sense of betrayal, and behavioral problems, such as seeking revenge, both during adolescence and adulthood. Such children are, as adolescents, more likely than others to join anti-social peer groups and gangs (Bell & Jenkins, 1991; Parsons, 1994). In the Nigerian context, studies have shown that adolescents who have been witnessing domestic violence are likely to be abused later on in life. Furthermore, their relationships with other people during adulthood are likely to be negatively affected (Adebayo, 2014; Onukwufor, 2013). Makhubela (2012) studied the influence of witnessing of domestic violence on identity development, and he concluded that there is a connection between the two. Adolescents who have witnessed domestic violence in the past tend to score low on self-initiative, have poor autonomy, and more intimacy problems than those who are brought up in non-violent homes.

### 1.9 Parental Negativity towards Adolescents

Antisocial behaviour among adolescents is usually associated with negative parental practices; for example, parental rejection, severe discipline, abusive words, and cursing may lead to anti-social behavior (Simons, Simons, Chen, Brody, & Lin, 2007). A study from Lagos, Nigeria, showed that adolescents brought up in overcrowded and aggressively parenting homes (with an atmosphere of punishments, lack of parental affection, frequent domestic conflicts, and parental criminality) exhibited higher levels of aggression during adolescence (Ani & Grantham-Gregor, 1998). Furthermore, boys from polygamous and overcrowded homes, living together with many siblings, received less parental affection than

others; they were more physically punished, they received less home supervision, witnessed more domestic conflicts, and usually had poor academic performance at school. They also became more aggressive (Ani & Grantham-Gregor, 1998). Houtzager and Baerveldt (1999) found that when adolescents are not getting parental affection, they tend to search for it outside of their home. They often turn to selected friends who might be involved in drugs and/or other antisocial behaviors. Uche (2010) conducted a study on peer pressure among adolescents and time management, and he found that adolescents who have been deprived of parental care seek more support from their peer group. In addition, parents' level of education is determining the kind of academic motivation a child receives at home; this, in turn, may have a long-term impact on both academic and other performance of the child.

### 1.10 Victimization from Parental Aggression

Frequent victimization from parental aggression has been linked to a diagnosis of mental health problems or to adolescent delinquency. An analysis of data from about 4,000 American adolescents found that anger was the biggest noticeable trauma symptom among young people who had been exposed to physical aggression from the side of their parents (Song, Singer, & Anglin, 1998). In Scotland, school children aged between 11 and 17 reported that the life as a victim of domestic violence was a life of fear, sadness, loneliness and is somewhat suicidal (Alexander, Macdonald, & Paton, 2005). Adebayo (2014) reported that children in the developing countries, especially in West Africa, experience a high rate of parental aggression. For example, the beating of children is seen as a normal practice; yet, most people are unaware of its psychological impact. Adolescents who have been exposed to parental aggression run a higher risk of becoming antisocial, underachievers with poor academic performance, having difficulties in trusting others, being stressed, and having depressions that sometimes lead to suicide (ibid.).

### 1.11 Victimization from Sibling Aggression

Sibling aggression is viewed by many as normal, and parents tend to downplay its prevalence and severity. Nonetheless, when the same type of behavior occurs between peers at school, it is viewed as abnormal abuse, bullying, and other forms of aggressive behavior (Tucker, Finkelhor, Turner, & Shattuck, 2013). Sibling aggression is rarely viewed as a crime, as parents and people in general might perceive it as beneficial for the



children's social development (Stormshak, Bellanti, & Bierman, 1996). Although there has been limited research on sibling aggression and methodological inconsistencies on how it should be defined and measured, the incidence rate of injuries due to sibling aggression reported in US national data in 2011 were 51.5% minor injuries, and 3.1% major injuries. These rates are surprisingly high. Krienert and Walsh (2011) concluded that since these were incidents reported to law enforcement, it is possible that this study only captured the tip of the iceberg. It appears obvious that overcrowding should be a fruitful environment for sibling aggression.

### 1.12 Sleep Deprivation, Overcrowding, and Aggressive Behaviour

Carskadon and Dement (2011) have defined sleep as a reversible behavioural state of perceptual disengagement from, and unresponsiveness to, the environment. Sleep deprivation refers to a state when the individual needs to sleep but is forced to stay awake. Sleep deprivation has been found to be associated with irritability, exhaustion, increased stress, and, in cases of long deprivation, psychotic behaviors (e.g. hallucinations) (Smith, Jones, & Gullickson, 1995). The quantity of sleep required differs from person to person, but in general, an adult individual should have between 7-9 hours of sleep each night.

According to a report by WHO (1987), living in overcrowded conditions leads to lack of sleep for all family members, and the report suggests that sleep deprivation might have an adverse effect on the academic achievement of children. Articles by Edwards, Baglioni and Cooper (1990), and Evans, Saegert and Harris (2001) have presented evidence for the fact that children raised in a crowded home usually show behavioural problems both at home and at school (see also Evans, Lepore, Shejwal, & Palsane, 1998). Overcrowding may affect the child's wellbeing and academic achievement due to noise and lack of a quiet place to study, and lack of productive sleep; it may affect mood and behaviour, and enhance susceptibility to illness, which in turn might interrupt their schooling routine (Saegert & Evans, 2003). Sleep deprivation has been found to contribute to anger and stress, which in turn may lead to acts of aggression (Edwards, Baglioni, & Cooper, 1990; Åkerstedt, Petersen, Axelsson, Lekander, & Kecklund, 2012).

Teenagers reporting inadequate sleep have been found to come from overcrowded homes; they tend to engage in numerous extra-curriculum activities, leading to emotional health concerns, poor school performance,

and behavioural problems (Dorofaeff & Denny 2006). Overcrowding has the propensity to invoke negative emotions, such as anger, and provoke insults between the cohabitants (Anderson & Carnegie, 2004; Wilkowski & Robinson, 2010). In individuals with a history of severe aggressive behavior (e.g. prison inmates, psychiatric patients), an association between poor sleep and aggressiveness has also been found (Anderson & Carnegie, 2004; Ireland & Culpin, 2006; Kamphuis, Dijk, Spreen, & Lancel, 2014; Kamphuis, Meerlo, Koolhaas, & Lancel 2012).

Noise pollution is the most common cause for sleep deprivation. According to Howden-Chapman (2004), noise pollution consists of excessive noise in overcrowded houses and from neighboring houses and traffic. The noise causes sleep disruption, which has been found to cause impaired concentration and irritability (Berglund, Lindvall & Schwela, 1995). In addition, noise has been found to negate prosocial and interpersonal responses, such as helping, sharing, and comforting behavior (Sherrod & Downs 1974). Furthermore, high-intensity noise also enhances interpersonal aggressive behavior (Cohen & Spacapan 1984; Donnerstein & Wilson 1976).

If adolescents are exposed to noise over a period of time, they tend to exhibit not only negative and antisocial behavior, but also withdrawal, anxiety agitation, and helplessness (Stansfeld, & Matheson, 2003). A study conducted by Bailey and Coore-Desai (2012) with Jamaican inner-city children found that there is a greater risk of violence and criminal acts among those who are exposed to noise. Their analysis revealed that shouting, noise making, fighting, verbal abuse, slapping, tearing pupil's books, hitting, and beating were more prevalent in early childhood classes of these children. Akpochafo (2014) also examined the prevalence of childhood violence and found that forms of antisocial behavior like shouting, fighting, noise making, verbal abuse, hitting, slapping, beating, and tearing of pupils' books are found both in rural and urban areas. Parents in overcrowded homes are less compassionate (Solari & Mare 2012), which may lower the quality of parenting, reflect negatively on the parent-teacher relationship, and this in turn may affect children's academic performance at school (Caldwell & Bradley 1984).

Adolescents growing up in an overcrowded home are likely to end up as their parents, contributing to social inequality (Leventhal & Newman 2010), negative parent-child relationships (Baldassare 1979; Evans, Lepore, Shejwal, & Palsane 1998), loneliness, and isolation (Wenz 1984), which all could contribute to mental health issues and premature mortality.

### 1.13 Overcrowding and Health Issues

Overcrowding and health issues have by several scholars been found to have an association with each other (Bansal & Saxena, 2002; Bartlett, 1999; Blake, Kellerson, Simic, Task, 2007; McNicholas, Lennon, Crampton, & Howden-Chapman, 2000). Overcrowding is also linked to poverty (Gove, Hughes, & Galle, 1979).

The health issues associated with overcrowding range from psychological stress (Edwards, Fuller, Vorakitphokatorn, & Sermsri, 1994) to infectious diseases such as tuberculosis and respiratory infections (Krieger & Higgins, 2002), delays in cognitive and psychomotor development (Evans, 2006), and increased incidents of colds, asthma, influenza and diarrhea, especially in young children (Causon-Kaas, Dzikus, Stephens, Højlyng, & Aaby, 1997; Kearns, Smith, & Abbott, 1992). Elender, Bentham, and Langford (1998) studied risk factors for tuberculosis in Wales, UK, and found that the risk was significantly higher in households where more than one person was living in each bedroom.

Guite, Clark, and Ackrill (2006) reported factors predicting poor mental health and vitality, and found that noise from the neighbours, overcrowding at home, and absence of satisfying green areas were such factors. Overcrowding is also thought to boost the vulnerability to malaria; as a result of high concentrations of carbon dioxide in the air and air pollution; the poor air quality is likely to facilitate the living conditions for mosquitos in overcrowded homes (Ghebreyesus, Haile, Witten, Getachew, Yohannes, Lindsay, & Byass, 2000).

Scholars from Nigeria and Uganda have found that malaria has a connection with long-term behavioural problems in children; in both studies, these problems ranged from lack of self-care to inattentiveness and hyperactivity, to the development of antisocial and abusive behavior, and even to hallucinations (Idro, Kakooza-Mwesige, Balyejjussa, Mirembe, Mugasha, Tugumisirize, & Byarugaba, 2010; Sowunmi, 1993).

Although infectious diseases have been linked to other health issues and to the development of behavioural problems, Study 4 of this thesis was the first one to address the question of whether there is an association between infectious diseases and peer aggression in a school context.

## 2. Method

### 2.1 Samples

Two samples were included in the studies. Sample 1 provided data for Studies 1, 2, and 3; Sample 2 provided data for Study 4.

*Sample 1:* Five public schools from each of the four cities of Ejigbo, Isolo, Egbe and Ago-Palace were randomly selected for participation in the study. A random selection of junior and senior secondary school classes (1–3) from each school resulted in a total sample of 238 adolescents participating in the study. The age range was 12–20 years. The sample consisted of 122 females ( $M_{\text{age}} = 15.1$  years,  $SD = 2.0$ ) and 116 males ( $M_{\text{age}} = 15.8$  years,  $SD = 2.0$ ). The age difference was not significant. Of the respondents, 72.3% ( $n = 172$ ) were Christians and 27.7% ( $n = 66$ ) were Muslims. A total of 71% ( $n = 169$ ) of the respondents lived in apartments with only one bedroom (crowded conditions), while 29% ( $n = 68$ ) lived in apartments with more than one bedroom.

*Sample 2:* The participants in Sample 2 were 284 adolescents (152 girls, 132 boys;  $M_{\text{age}} = 14.2$  years,  $SD = 1.7$ ) from five private secondary schools in Ejigbo, Lagos, Nigeria. The pupils were chosen randomly from both junior and senior schools for participation in the study. In demographic respects, they reminded of the participants in Sample 1.

### 2.2. Instruments

The data were collected using paper-and-pencil questionnaires and distributed to the respondents during school lessons. *Questionnaire 1*, distributed to Sample 1, included six scales constructed specifically for the study: (1) victimisation from adult aggression, (2) victimisation from sibling aggression, (3) witnessing of domestic violence, (4) parental negativity towards adolescents, (5) antisocial behaviour of adolescents, and (6) poverty. The items were constructed in focus group discussions in which three persons took part: two of them were experts in psychometrics, and the third an expert in local conditions. Lack of food or medicine in the home served as an indicator of poverty, since adolescents seem seldom capable of giving exact information about the family's economic situation, but they are likely to know whether there is a lack of food or medicine in the home. Responses to all items were given on a five-point scale (never, seldom, sometimes, often, and very often) measuring the degree to which

respondents agreed upon the statements. Items and reliability scores (Cronbach's  $\alpha$ ) of the scales are presented in Table 1.

Table 1

*Items and Reliability Scores of the Scales included in Questionnaire 1 (N = 238)*

Scales and items
<i>Victimisation from adult aggression</i> (7 items; $\alpha = .84$ )
Pulled your ears, Pulled your hair, Slapped you, Hit you with an object, Pinched you, Thrown things at you, Sleep punishment
<i>Victimisation from sibling aggression</i> (7 items; $\alpha = .91$ )
Pulled your hair, Slapped you, Hit you with an object, Pinched you, Thrown things at you, Twisted your arms, Bitten you
<i>Parental negativity towards adolescents</i> (6 items; $\alpha = .84$ )
Name calling or bullying, Insults, Making and breaking of promises, Constant criticism, Intimidation, Harassment
<i>Witnessing of domestic violence</i> (6 items; $\alpha = .82$ )
Physical fights, Quarrels, Thrown things at each other, Damaged belongings
Twisted each other's arm, Stabbed each other
<i>Antisocial behaviour of adolescents</i> (7 items; $\alpha = .87$ )
Stolen petty things, Used a catapult on a friend or neighbour or someone else, Cheated neighbours of their belongings, Smoked cigarettes, Unconcentrated at school, Fighting in school, Absenteeism from school
<i>Poverty</i> (measured as lack of food or medicine) (3 items; $\alpha = .79$ )
Food rationing, Unavailable or inadequate medication, Unavailable or inadequate food or drink

*Questionnaire 2* was distributed to Sample 2, providing data for Study 4. Also, in this case, the respondents filled in a paper-and-pencil questionnaire during regular school lessons. The questionnaire included a number of scales and single items, of which here will be reported data on peer aggression (both perpetration and victimization), and how often the respondents had been sick with (1) malaria, (2) yellow fever, (3) typhoid fever, and (4) cough and flu. The response alternatives were 0 = never, 1 = seldom, 2 = sometimes, 3 = often, and 4 = very often.

Three types of aggression, physical, verbal, and indirect, were measured, based on the Direct & Indirect Aggression Scales (DIAS; Björkqvist, Lagerspetz, & Kaukiainen, 1992). The items were adapted to suit the situation in Nigerian schools. Single items and reliability scores of both the perpetration and the victim versions of the scales are presented in Table 2. The wordings in Table 2 pertain to the perpetration version, but

the victimization version described the same acts (e.g. “I have been hit”, “I have been locked in or out”).

Table 2

*Items and Reliability Scores of the Scales Included in Questionnaire 2, for Both the Perpetrator and Victim Versions of the Scales. The Items in the Table Represent the Perpetrator Version. The First  $\alpha$ -score Pertains to Perpetration, the Second to Victimisation (N = 283)*

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<i>Physical Aggression (<math>\alpha = .76, \alpha = .74</math>)</i>
I hit somebody
I locked somebody in or out
I bit somebody
I spit at somebody
I threw objects at somebody
I damaged somebody's items
<i>Verbal Aggression (<math>\alpha = .78, \alpha = .78</math>)</i>
abused somebody
I threatened to hurt somebody's items
I yelled/shouted at somebody
I picked a fight with somebody
I intentionally said nasty things about somebody
I called somebody bad names
<i>Indirect Aggression (<math>\alpha = .68, \alpha = .73</math>)</i>
I gossiped about somebody
I spread false rumours about somebody
I threatened to end the friendship with somebody
I disclosed somebody's secrets
I was rolling eyes at somebody
I ignored somebody completely

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## 2.3 Ethical Considerations

The studies adhere to the principles concerning human research ethics of the Declaration of Helsinki (World Medical Association, 2013), as well as the guidelines for the responsible conduct of research of the Finnish Advisory Board on Research Integrity (2012). The collected data are stored according to the regulations for the protection of data by the European Commission (2016). Participation was voluntary without any form of

economic or other incentive. The research was conducted with strict confidentiality and informed consent from participants, their parents, and school authorities.

### 3. Overview of the Original Studies

#### 3.1 Study I: Overcrowding as a risk factor for domestic violence and antisocial behaviour among adolescents in Ejigbo, Lagos, Nigeria

The objective of Study 1 was to investigate the relationships between overcrowding and various types of domestic violence and antisocial behaviour in a sample of adolescents in the Lagos metropolitan area, Nigeria. Possible gender differences and differences due to religious affiliation concerning domestic violence and antisocial behaviour were also investigated. A questionnaire was filled in by 238 Nigerian adolescents, 12–20 years of age; the sample included 122 females ( $M_{\text{age}} = 15.1$  years,  $SD = 2.0$ ) and 116 males ( $M_{\text{age}} = 15.8$  years,  $SD = 2.0$ ). The respondents were from junior and senior secondary schools in Ejigbo and surrounding cities (Isolo, Egbe, and Ago-Palace Lagos), who filled in a paper-and-pencil questionnaire during school lessons. Besides measures of overcrowding and other demographic variables, six scales were included: adolescents as victims of (1) adult and (2) sibling aggression, respectively, (3) witnessing of domestic violence, (4) parental negativity towards adolescents, (5) antisocial behaviour among adolescents and (6) poverty in the home. These scales are presented in detail in section 2.2 of this thesis.

The following research questions were posed: (i) whether adolescents living in crowded conditions experience more psychosocial problems than do others, (ii) whether a difference between male and female adolescents in respect to these problems exists, or (iii) whether a difference between Christian or Muslim adolescents could be found in this respect, and (iv) whether there is a difference in the strength of the association between overcrowding, gender, religious affiliation and the six variables above.

When applying the definition by Eurostat (2014), it was found that 71.1% of the adolescents lived in overcrowded conditions. Of families living in one-bedroom apartments, 70.8% were Muslims and 29.2% Christians. Of the families, 24.4% did not have running water, 38.5% cooked their meals in the corridor outside their room(s), and 51.3% of them had access to electricity often or very often, the others less often.

The results were analysed with correlations, multivariate analyses of variance (MANOVA), and multiple linear regression analyses. The six scales of the study were highly inter-correlated, with all the correlations being at the .001-level.

*Effect of crowdedness:* A MANOVA was performed comparing adolescents living in crowded homes (defined as the family members all living in the same bedroom) with adolescents living in less crowded conditions. Since families living in one room apartments displayed a higher level of poverty, poverty was kept as a covariate in the analysis. Adolescents living in crowded conditions scored significantly higher than others on being victimised from both adult and sibling aggression, on witnessing of domestic violence between family members, and they also reported more antisocial behaviour problems. They did, however, not perceive themselves as more subjected to parental negativity than other adolescents.

*Effect of gender:* It was found that adolescent males scored higher than adolescent females on victimisation from sibling aggression. They also tended to perceive themselves as targets of more parental negativity than females. Adolescent males also scored significantly higher on antisocial behaviour. The degree of crowding was kept as a covariate in the analyses of gender differences.

*Effect of religion:* Since a proportionally larger extent of the families in the study living in only one-bedroom apartments were Muslims, Muslims were overall likely to experience problems related to overcrowding to a significantly higher degree than Christians. Overcrowding was accordingly kept as a covariate when analyses of differences due to religion were conducted. It was shown that Muslim adolescents still reported higher scores on being victimised from sibling aggression, witnessing of domestic violence, and antisocial behaviour, when overcrowding was partialled out by being kept as a covariate. There were no significant differences between the two religious groups on victimisation from adult aggression or on parental negativity towards adolescents.

*Overcrowding vs. gender vs. religion:* Five multiple linear regression analyses were performed, in which overcrowding, gender, and religious affiliation served as predictors of the five outcome variables in the study, i.e. adolescents as victims of (1) adult and (2) sibling aggression, respectively, (3) witnessing of domestic violence, (4) parental negativity towards adolescents, and (5) antisocial behaviour among adolescents. Overcrowding was found to be a significant predictor of all five outcome



variables, whereas gender predicted only one, and religion two of the variables. Overcrowding thus appears to be an influential factor in domestic life in Lagos, predicting victimisation of adolescents from both adult and sibling aggression, as well as witnessing of domestic aggression between family members, being themselves recipients of parental negativity, and having a significantly higher level of antisocial problems.

A limitation of the study was that it was cross-sectional and not longitudinal, and overcrowding cannot therefore with certainty be claimed to be the cause of these negative outcomes.

### 3.2 Study II: Mediating factors between overcrowding and adolescent antisocial behaviour in Lagos, Nigeria

The aim of Study 2 was to investigate mediating factors between overcrowding and antisocial behavior in adolescents in the Lagos metropolitan area, Nigeria. In Study 1, it was shown that overcrowding impacted on the level of antisocial behavior in Nigerian youth; Study 2 took the investigation a step further, in an attempt to identify possible factors serving as mediators between overcrowding and antisocial behaviour. The effect of overcrowding on antisocial behaviour is probably not primarily direct, but indirect; overcrowding may lead to negative domestic experiences that in turn reinforce the youth to behave antisocially outside of the home. It was hypothesized that overcrowding leads to frustration (the frustration-aggression hypothesis; Dollard, Miller, Doob, Mowrer, & Sears, 1939), which increases domestic negativity, aggression, and violence. The domestic aggression, in turn, provides models which, through socio-cognitive learning processes (the general aggression model; DeWall, Anderson, & Bushman, 2011) increase the adolescents' propensity to behave antisocially in society-at-large. In the current study, the potential mediating effect of the following four domestic factors was investigated: (1) witnessing of domestic violence, (2) parental negativity towards the child, (3) victimization from parental aggression, and (4) victimization from aggression by siblings. In Study 1, all four of them were found to be associated with adolescent antisocial behaviour.

The sample was the same as in Study 1, and the scales used in the analyses were also identical. The mediation analysis was conducted with the SPSS macro PROCESS (Hayes, 2012), based on bootstrapping. Bootstrapping builds an empirical approximation of the sampling distribution and uses this to construct confidence intervals for the indirect effects (Preacher & Hayes, 2004).

The results of a first analysis showed that there was no moderating effect of gender, and, therefore, boys and girls were not separated in the final analysis. All  $\beta$ -coefficients of the mediating variables had 95% confidence intervals that did not include 0.00. The direct effect ( $c$ ) of overcrowding on antisocial behaviour without mediation was .95. The direct effect of overcrowding on antisocial behavior when the mediating variables were included in the equation ( $c^1$ ) was reduced to .27. The greater the difference between  $c$  and  $c^1$  (which is defined as the total  $ab$ ), the greater is the mediating effect of the included mediators. The mediating effect of all four mediating variables (the total  $ab$ ) was .68. Accordingly, the mediating effect of the four variables was quite substantial. The results suggest that the four variables serving as mediators in the analysis did indeed have an indirect effect on antisocial behaviour.

This finding gives support to the hypothesis that overcrowding causes irritation and frustration in the family, thus increasing domestic negativity, and aggression in the home. Through socio-cognitive learning processes, the propensity to behave aggressively contributes to increased antisocial behaviour in school and the society-at-large. The findings thus provide a theoretical explanation of the in Study 1 observed association between overcrowding and antisocial behaviour in adolescents in Nigeria. However, due to the fact that the study was cross-sectional and not longitudinal, extrapolations about cause and effect have to be made with caution.

### 3.3 Study III: The association between sleep deprivation, aggression, and antisocial behaviour in adolescents in Ejigbo, Lagos, Nigeria

The aim of Study 3 was to investigate the relationship between lack of sleep and aggressive and antisocial behavior in adolescents in Ejigbo, Lagos, Nigeria. A typical feature of living in overcrowded conditions is exposure to noise and, as a consequence, sleep deprivation. Sleep deprivation refers to a state when the individual needs to sleep, but is forced to stay awake.

The sample and variables used in Study 3 were the same as in Studies 1 and 2. Those who lived in crowded conditions (one bedroom per family) slept at an average 6 hours ( $SD = 1.5$ ) per night, while those who lived in non-crowded conditions (more than one bedroom per family) slept at an average 7.8 hours ( $SD = 1.2$ ) per night. The difference was significant.

The total sleeping time correlated significantly negatively with the five scales of (1) adult aggression (-.30), (2) sibling aggression (-.45), (3) domestic violence (-.47), (4) parental negativity (-.34), and (5) antisocial behaviour (-.43). That is, the less the adolescents slept at night, the more psychosocial problems they experienced.

As is well-known, correlations do not prove causality. However, the results are very consistent, and in line with those by for instance Anderson and Carnagey (2004), Dorofaeff and Denny (2006), Edwards et al. (1994), Åkerstedt et al. (2012), and Wilkowski and Robinson (2010), who also found an association between lack of sleep and aggression and antisocial behaviour. There is also previous evidence for a connection between overcrowding and lack of sleep (as in the present study) and exposure to noise (Howden-Chapman, 2004).

This study is yet an argument for the need to avoid overcrowded housing conditions for humanitarian reasons.

### 3.4 Study IV: The association between the contraction of infectious diseases and aggressive behaviour at school: A study among adolescents in Ejigbo, Lagos, Nigeria

The aim of the present study was to investigate the relationship between infectious diseases and aggression in peer groups at school among adolescents in Ejigbo, Lagos, Nigeria. Adolescents living in overcrowded conditions are exposed to different kinds of health issues (Bansal & Saxena, 2002; Bartlett, 1999; Blake, Kellerson, Simic, Task, 2007; McNicholas, Lennon, Crampton, & Howden-Chapman, 2000).

The new health guidelines of the World Health Organization (n.d.) highlight that crowded housing increases the risk of exposure to infectious and respiratory diseases, and it may also have an impact on mental health issues. The guidelines further state that improved housing conditions by installing basic housing needs will not only save lives, reduce emission, improve the quality of life and reduce poverty, but it will also contribute to achieving the UN's Sustainable Development Goals.

The participants in Study 4 belonged to a different sample than those of Studies 1–3. They are here referred to as Sample 2, and consisted of 284 adolescents (152 girls, 132 boys;  $M_{\text{age}} = 14.2$  years,  $SD = 1.7$ ) from five private secondary schools in Ejigbo, Lagos, Nigeria. The pupils were chosen randomly from both junior and senior schools for participation in the study. In demographic respects, they reminded of the participants in Sample 1.

The questionnaire also differed from the one used in Studies 1–3. The questionnaire included a number of scales and single items, of which here will be reported data on peer aggression (both perpetration and victimization), and how often the respondents had been sick with (1) malaria, (2) yellow fever, (3) typhoid fever, and (4) cough and flu. The response alternatives were 0 = never, 1 = seldom, 2 = sometimes, 3 = often, and 4 = very often.

Three types of aggression, physical, verbal, and indirect, were measured, based on the Direct & Indirect Aggression Scales (DIAS; Björkqvist, Lagerspetz, & Kaukiainen, 1992). The items were adapted to suit the situation in Nigerian schools. The scale is presented in detail in section 2.2.

The diseases all correlated significantly with each other; that is, if a respondent had contracted one disease, there was an increased likelihood that he or she had contracted others as well.

The correlations between how often the respondents had suffered from either malaria, typhoid fever, yellow fever, and cough and flu, and how often they had been victims from or perpetrated either physical, verbal, or indirect were all positive; they were either medium sized or low, but all were significant.

The results of Study 4 indicate that there indeed is an association between the contraction of infectious diseases and both the perpetration of and victimization from peer aggression at school, at least in this Nigerian sample. The finding is novel, but it is supported by the previous study by Idro et al. (2010), which found malaria to be associated with behavioral problems.

However, it would be incorrect to draw any conclusions about cause and effect. It appears more likely to assume that the association is caused by a third factor, which increases the risk for both the contraction of infectious diseases *and* the development of aggressive behavior. It has been shown that overcrowding increases the risk of infectious diseases (Ghebreyesus et al., 2000; Krieger & Higgins, 2002) but also of antisocial behavior in a school context (Studies 1 and 2). Overcrowding, which on hand leads to poor indoors' air quality, on the other to stress on interpersonal relations, could therefore be one (but probably not the only) attributing factor to both problems.

#### 4. Summary and Conclusive Remarks

The current thesis is a collection of articles investigating the relationships between overcrowding, domestic aggression, and antisocial behaviour in adolescents in Ejigbo, Lagos, Nigeria. The associations between domestic aggression and antisocial behaviour with sleep deprivation and contagious diseases, respectively, were also investigated. The results of Study 1 showed that adolescents living in crowded conditions scored significantly higher than others on being victimised from both adult and sibling aggression in domestic settings, on witnessing of domestic violence between family members, and they also reported more antisocial behaviour problems. Further, according to multiple linear regression analyses with overcrowding, gender, and religion as predictors and five scales measuring aggression and antisocial behaviour as outcome variables, overcrowding tended to partial out the effects of both gender and religion, showing that overcrowding was the most important factor determining negative outcomes.

Study 2 investigated mediating factors between overcrowding and adolescent antisocial behaviour in the same sample of adolescents. In the study, the potential mediating effect of the four domestic factors was investigated, namely witnessing of domestic violence, parental negativity towards the child, victimization from parental and sibling aggression. In Study 1, all four of them had been found to be associated with adolescent antisocial behaviour. The results of Study 2 showed that the four mediators had a quite substantial mediating effect on the antisocial behaviour of the respondents. This finding gives support to the hypothesis that overcrowding causes irritation and frustration in the family, thus increasing domestic negativity and aggression in the home. Through socio-cognitive learning processes, the propensity to behave aggressively contributes to increased antisocial behaviour in school and the society-at-large.

In Study 3, it was investigated whether there were associations between how much adolescents slept per night and how much aggressive and antisocial behaviour they displayed and were exposed to. The results showed that the total sleeping time of the adolescents correlated negatively with five scales measuring adult aggression, sibling aggression, witnessing of domestic violence, parental negativity, and antisocial behaviour. Thus, the less the adolescents slept, the more they were exposed to aggression, and they also themselves behaved more aggressively and antisocially. Adolescents living in overcrowded conditions also slept less than others; i.e., the less the adolescents slept at night, the more psychosocial problems they experienced. Finally, in Study 4, it was investigated whether there is an association between the contraction of infectious diseases and peer aggression in a school context among another sample of adolescents in Ejigbo, Lagos, Nigeria. The results of the study indicated that there is indeed an association between the contraction of infectious diseases and both the perpetration of and victimization from peer aggression at school, at least in this Nigerian sample. The finding is supported by a previous study by Idro et al. (2010), which found malaria to be associated with behavioural problems. It would be wrong to make a conclusive argument about the cause and effect; the association is most likely caused by a third factor, perhaps overcrowding, which increases the risk for both the contraction of infectious diseases and the development of aggressive behaviour. It has been shown that overcrowding increases the risk of infectious diseases (Ghebreyesus et al., 2000; Krieger & Higgins, 2002) but also of antisocial behavior in a school context (Studies 1 and 2).

There are certain limitations to the studies. Since the research was not longitudinal but cross-sectional in nature, overcrowding cannot unequivocally be shown to be the cause of all the negative outcomes, as only associations between variables were observed. Generalisations of the results to other parts of Nigeria should be made with caution, taking special characteristics of that area into consideration. However, the studies are an argument for the need to avoid overcrowded housing conditions for humanitarian reasons. The studies have implications for housing policies in Nigeria, and also for other densely populated areas in the world. Special focus should be placed on the needs of adolescents.

## References

- Adeyemi, E. O., Waziri, B. A., Atere, A. A., & Emmanuel, A. (2009). Economic reforms, living conditions and urban violence: a situation analysis of metropolitan Lagos. *Ethiopian Journal of Environmental Studies and Management*, 2, 36–48. doi:10.4314/ejesm.v2i2.45918.
- Adegoke, A. A. (2014). Perceived effects of overcrowding on the physical and psychological health of hostel occupants in Nigeria. *Journal of Humanities and Social Science*, 9, 1-9.
- African Commission on Human and Peoples' Rights. (1990). African Union charter on the rights and the welfare of the child. [http://www.achpr.org/files/instruments/child/achpr\\_instr\\_charterchild\\_eng.pdf](http://www.achpr.org/files/instruments/child/achpr_instr_charterchild_eng.pdf)
- Ahianba, J. E., Dimuna, K. O., & Okogun, G. R. A. (2008). Built environment decay and urban health in Nigeria. *Journal of Human Ecology*, 23, 259–265.
- Åkerstedt, T., Orsini, N., Petersen, H., Axelsson, J., Lekander, M., & Kecklund, G. (2012). Predicting sleep quality from stress and prior sleep—a study of day-to-day covariation across six weeks. *Sleep Medicine*, 13, 674–679.
- Akinwolemiwa, F., & Gwilliam, J. (2014). The effect of climate and culture on housing among low income groups in Lagos, Nigeria. 8th Windsor Conference, 10–13 April, Windsor, UK.
- Akpochofa, G. O. (2014). Teachers' perception of prevalence and forms of violence in early childhood classes in Delta State of Nigeria. *Journal of Educational and Social Research*, 4, 469–474.
- Anderson, C. A., & Carnagey, N. L. (2004). Violent evil and the general aggression model. In A. G. Miller (Ed.), *The social psychology of good and evil*



- (pp.168–192). New York: Guilford Press.
- Ani, C. C., & Grantham-McGregor, S. (1998). Family and personal characteristics of aggressive Nigerian boys: Differences from and similarities with Western findings. *Journal of Adolescent Health*, 23, 311–317. doi:10.1016/S1054-139X(98)00031-7
- Bailey, C., & Coore-Desai, C. (2012). The effect of exposure to community violence on levels of aggression: Evidence from a sample of Jamaican children. *Childhood*, 19, 188–203.
- Baldassare, M. (1979). *Residential crowding in urban America*. Berkeley, CA: University of California Press.
- Bansal, R. K., & Saxena, D. M. (2002). Overcrowding and health. *Indian Journal of Medical Sciences* 56, 177–179.
- Bartlett, S. (1999). Children's experience of the physical environment in poor urban settlements and the implications for policy, planning and practice. *Environment and Urbanization* 11, 63–74.
- Berglund, B., Lindvall, T., & Schwela, D. (1995). From the WHO Guidelines for community noise to healthy soundscapes. <http://www.who.int/iris/handle/10665/66217>
- Björkqvist, K., Lagerspetz, K. M. J., & Kaukiainen, A. (1992). Do girls manipulate and boys fight? Developmental trends in regard to direct and indirect aggression. *Aggressive Behavior*, 18, 117–127.
- Blake, K. S., Kellerson, R. L., Simic, A., & Task, E. (2007). *Measuring overcrowding in housing*. US Department of Housing and Urban Development. [https://www.huduser.gov/Publications/pdf/Measuring\\_Overcrowding\\_in\\_Hsg.pdf](https://www.huduser.gov/Publications/pdf/Measuring_Overcrowding_in_Hsg.pdf)
- Baum, A., & Koman, S. (1976). Differential response to anticipated crowding: Psychological effects of social and spatial density. *Journal of Personality and Social Psychology*, 34, 526–536.
- Caldwell, B. M., & Bradley, R. H. (1984). *Home observation for measurement of the environment*. Little Rock, AR: University of Arkansas at Little Rock.
- Carskadon, M.A., Dement, W.C. (2011). Monitoring and staging human sleep. In Kryger, M.H., Roth, T., Dement, W.C. (Eds.), *Principles and practice of sleep medicine*, 5th edition, (pp. 16–26). St. Louis MS: Elsevier Saunders.
- Chianu, E. (2000). Two deaths, one blind eye, one imprisonment: Child abuse in the guise of corporal punishment in Nigeria schools. *Child Abuse & Neglect*, 24, 1005–1009. doi:10.1016/S0145-2134(00)00154-X
- Chinawa, J. M., Aronu, A. E., Chukwu, B. F., & Obu, H. A. (2014). Prevalence and pattern of child abuse and associated factors in four secondary institutions in Enugu, Southeast Nigeria. *European Journal of*

- Pediatrics*, 173, 451–456.  
doi:10.1007/s00431-013-2191-4
- Clauson-Kaas, J., Dzikus, A., Stephens, C., Højlyng, N., & Aaby, P. (1996). Urban health: Human settlement indicators of crowding, *Third World Planning Review*, 3, 349–363
- Cohen, S., & Spacapan, S. (1984). The social psychology of noise. In D. M. Jones & A. J. Chapman (Eds.), *Noise and society* (pp. 221–245). Chichester, UK: Wiley.
- DeWall, C. N., Anderson, C. A., & Bushman, B. J. (2011). The general aggression model: theoretical extensions to violence. *Psychology of Violence*, 1, 245–258.
- Dollard, J., Miller, N. E., Doob, L. W., Mowrer, O. H., & Sears, R. R. (1939). *Frustration and aggression*. New Haven, CN: Yale University Press
- Donnerstein, E., Wilson, D. (1976). Effects of noise and perceived control on ongoing and subsequent aggressive behavior. *Journal of Personality and Social Psychology*, 34, 774–781.
- Dorofaeff, T. F., & Denny, S. (2006). Sleep and adolescence. Do New Zealand teenagers get enough? *Journal of Paediatrics and Child Health*, 42, 515–520.
- Dunstan, J. (1979). The effect of crowding on behaviour: Empirical measures for testing theoretical models. *Urban Studies*, 16 (3), 299–307.
- Edwards, J. N. (1994). *Household crowding and its consequences*. Boulder, CO: Westview Press.
- Edwards, J. N., Fuller, T. D., Vorakitphokatorn, S. & Sermsri, S. (1994). *Urban sociology and community studies - household crowding and its consequences*. Boulder, CO: Westview Press.
- Edwards, J. R., Baglioni, A. J., & Cooper, C. L. (1990). Stress, Type-A, coping, and psychological and physical symptoms: A multi-sample test of alternative models. *Human Relations*, 43, 919–956.
- Elender, F., Bentham, G. and Langford, I. (1998). Tuberculosis mortality in England and Wales during 1982-1992: Its association with poverty, ethnicity and AIDS, *Social Science Medicine*, 46, 673–681.
- European Commission. (2016). *Data protection. Rules for the protection of personal data inside and outside the EU*.  
[https://ec.europa.eu/info/law/law-topic/data-protection\\_en](https://ec.europa.eu/info/law/law-topic/data-protection_en)
- Eurostat. (2014). Statistics explained. Glossary: Overcrowding rate.  
[http://ec.europa.eu/eurostat/statisticsexplained/index.php/Glossary:Overcrowding\\_rate](http://ec.europa.eu/eurostat/statisticsexplained/index.php/Glossary:Overcrowding_rate)
- Evans, G. W. (2006). Child development and the physical environment. *Annual Review of Psychology*, 57, 423–451.
- Evans, G. W., Lepore, S. J., Shejwal, B. R., & Palsane, M. N. (1998). Chronic residential crowding and children's well-being: An ecological perspective. *Child Development*, 69, 1514–1523.

- Evans, G. W., Saegert, S., & Harris, R. (2001). Residential density and psychological health among children in low-income families. *Environment and Behavior*, 33, 165–180.
- Finnish Advisory Board on Research Integrity (2012). *Responsible conduct of research and procedures for handling allegations of misconduct in Finland*. Helsinki: Finnish Advisory Board on Research Integrity.
- Ghebreyesus, T. A., Haile, M., Witten, K. H., Getachew, A., Yohannes, M., Lindsay, S. W., & Byass, P. (2000). Household risk factors for malaria among children in the Ethiopian highlands. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 94, 17–21.
- Gove, W. R., Hughes, M., & Galle, O. R. (1979). Overcrowding in the home: An empirical investigation of its possible pathological consequences. *American Sociological Review*, 44, 59–80.
- Gray, A. (2001). *Definitions of crowding and the effects of crowding on health: A literature review*. New Zealand Ministry of Social Policy, Wellington, New Zealand: Gray Matter Research. <http://www.msd.govt.nz/documents/about-msd-and-our-work/publicationsresources/archive/2001-definitions-of-crowding.pdf>
- Guite H. F, Clark C, & Ackrill G. (2006). The impact of the physical and urban environment on mental well-being. *Public Health*, 120, 1117–1126.
- Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling. White paper, Ohio State University, Ohio, OH. <http://www.afhayes.com/public/process2012.pdf>
- Hotwani, G. P., & Tripathi, S. K. (2017). The Reciprocal Effect of Crowding and Experiential Stress. *Journal of Humanities and Social Science*, 22 16-19.
- Howden-Chapman, P. (2004). Housing standards: a glossary of housing and health. *Journal of Epidemiology & Community Health*, 58, 162–168.
- Idro, R., Kakooza-Mwesige, A., Balyejjussa, S., Mirembe, G., Mugasha, C., Tugumisirize, J., & Byarugaba, J. (2010). Severe neurological sequelae and behaviour problems after cerebral malaria in Ugandan children. *BMC Research Notes*, 1, 104
- Ifemeje, S. C. (2012). Gender-based domestic violence in Nigeria. A socio-legal perspective. *Indian Journal of Gender Studies*, 19, 137–148. doi:10.1177/097152151101900107
- Ireland, J. L., & Culpin, V. (2006). The relationship between sleeping problems and aggression, anger, and impulsivity in a population of juvenile and young offenders. *Journal of Adolescent Health*, 38, 649–655.

- Kamphuis, J., Dijk, D. J., Spreen, M., & Lancel, M. (2014). The relation between poor sleep, impulsivity and aggression in forensic psychiatric patients. *Physiology & Behavior*, 123, 168–173.
- Kamphuis, J., Meerlo, P., Koolhaas, J. M., & Lancel, M. (2012). Poor sleep as a potential causal factor in aggression and violence. *Sleep Medicine*, 13, 327–334.
- Kearns, R. A., Smith C. J., & Abbott, M. (1992) The stress of incipient homelessness, *Housing Studies*, 4, 280–298.
- Krieger, J. & Higgins, D. L. (2002) Housing and health: Time again for public health action. *American Journal of Public Health*, 5, 758–768.
- Leventhal, T., & Newman, S. (2010). Housing and child development. *Children and Youth Services Review*, 32, 1165–1174.
- Makinde, O., Björkqvist, K., & Österman, K. (2016). Overcrowding as a risk factor for domestic violence and antisocial behaviour among adolescents in Ejigbo, Lagos, Nigeria. *Global Mental Health*, 3, e16, 1–9. doi:10.1017/gmh.2016.10
- Makinde, O., Björkqvist, K., & Österman, K. (2017). Mediating factors between overcrowding and adolescent antisocial behavior in Lagos, Nigeria. *Pyrex Journal of African Studies and Development*, 3, 24–30.
- Makinde, O., Österman, K., & Björkqvist, K. (2018). The association between sleep deprivation, aggression, and antisocial behavior in adolescents in Ejigbo, Lagos, Nigeria. *European Journal of Interdisciplinary Studies*, 10 (1), 154–158. doi:10.26417/ejis.v10i1.p154-158
- Makinde, O., Björkqvist, K., & Österman, K. (2020). The association between the contraction of infectious diseases and aggressive behavior at school: A study among adolescents in Ejigbo, Lagos, Nigeria. *European Journal of Social Science, Education and Research*, 7, 59–64.
- McNicholas, A., Lennon, D., Crampton, P., & Howden-Chapman, P. (2000). Overcrowding and infectious diseases - when will we learn the lessons of our past? *New Zealand Medical Journal* 113, 453–454.
- National Population Commission (NPC) [Nigeria] and ICF International. (2014). Nigeria Demographic and Health Survey 2013. Abuja, Nigeria and Rockville, Maryland, USA: NPC and ICF International. <https://dhsprogram.com/pubs/pdf/FR293/FR293.pdf>
- New World Encyclopedia. (2015). Nigeria. <http://www.newworldencyclopedia.org/entry/Nigeria>
- Okeahialam, T. C. (1984). Child abuse in Nigeria. *Child Abuse & Neglect*, 8, 69–73. doi:10.1016/0145-2134(84)90051-6
- Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in

- simple mediation models. *Behavior Research Methods, Instruments, & Computers*, 36, 717–731.
- Regoeczi, W. C. (2008). Crowding in context: An examination of the differential responses of men and women to high-density living environments. *Journal of Health and Social Behavior*, 49, 254–268.
- Saegert, S., & Evans, G. W. (2003). Poverty, housing niches, and health in the United States. *Journal of Social Issues*, 59, 569–589.
- Sherrod, D. R., & Downs, R. (1974). Environmental determinants of altruism: The effects of stimulus overload and perceived control on helping. *Journal of Experimental Social Psychology*, 10, 468–479.
- Smith, A. P., Jones, D. M., & Gullickson, T. (1995). *Handbook of human performance*, Vol. 1. *Psychocritiques*, 40, 709–709.
- Solari, C. D., & Mare, R. D. (2012). Housing crowding effects on children's wellbeing. *Social Science Research*, 41, 464–476.
- Sowunmi A, (1993). Psychosis after cerebral malaria in children. *Journal of the National Medical Association*, 85, 695–696.
- Stansfeld, S. A., & Matheson, M. P. (2003). Noise pollution: Non-auditory effects on health. *British Medical Bulletin*, 68, 243–257.
- UN. (2010). *World urbanisation prospects. The 2009 revision*. New York: United Nations Department of Economic and Social Affairs.
- UN General Assembly. (1989). *Convention on the Rights of the Child*, 20 November 1989, United Nations, Treaty Series, 1577, 3.
- UN-HABITAT. (2010). *The state of African cities 2010. Governance, inequality and urban land markets*. Nairobi, Kenya: United Nations Human Settlement Programme.
- UNICEF. (2013). Fact sheet. Child rights legislation in Nigeria. United Nations Children's Fund. [http://www.unicef.org/nigeria/Child\\_rights\\_legislation\\_in\\_Nigeria.pdf](http://www.unicef.org/nigeria/Child_rights_legislation_in_Nigeria.pdf)
- UN. (2019). *World population prospects: The 2019 revision*. <https://www.un.org/development/desa/publications/world-population-prospects-2019-highlights.html>
- Uzodimma, C. C., Ogundeyi, M. M., Dedek, F. I., & Owolabi, O. (2013). Child maltreatment, abuse and neglect in a Nigerian adolescent boy, the common but unheard menace: A case report from southwest, Nigeria. *Open Journal of Pediatrics*, 3, 377–380. doi:10.4236/ojped.2013.34068.
- Wenz, F. V. (1984). Household crowding, loneliness and suicide ideation. *Psychology: A Journal of Human Behavior*, 2, 25–29.
- WHO. (1999). *Overcrowding*. World Health Organization. <http://apps.who.int/ceh/indicators/overcrowding.pdf>
- Wilkowski, B. M., & Robinson, M. D. (2010). The anatomy of anger: An integrative cognitive model

- of trait anger and reactive aggression. *Journal of Personality*, 78, 9–38.
- Wilson-Oyelaran, E. B. (1989). The ecological model and study of child abuse in Nigeria. *Child Abuse & Neglect*, 13, 379–387.
- World Population Review (2020) <https://worldpopulationreview.com/world-cities/lagos-population>
- World Health Organization. (n.d.) <https://www.who.int/ith/diseases/malaria/en/>
- World Medical Association. (2013). Declaration of Helsinki: Ethical principles for medical research involving human subjects. *JAMA*, 310, 2191–2194. <https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/>.



Olusegun Makinde

# **Overcrowding, Sleep Deprivation, and Infectious Diseases as Risk Factors for Aggressive and Antisocial Behaviour in Nigerian Adolescents**

The thesis examines the relationships between overcrowding, domestic aggression, anti-social behaviour, sleep deprivation and infectious diseases among adolescents in Lagos, Nigeria. The participants in the study were both from junior and senior secondary school in overcrowded communities in Ejigbo and its surroundings of Lagos state, Nigeria.

The findings show that adolescents living in overcrowded conditions have the propensity to behave aggressively and antisocially to a higher extent than adolescents living in less crowded conditions. They also experience domestic aggression more than others. They suffer more from sleep deprivation, and from infectious diseases. The results have implications for housing policies in Nigeria and other nations around the world.

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