

**SCREEN TIME USAGE AMONG PRESCHOOL CHILDREN AGED 3-5 YEARS IN
NAIROBI COUNTY, KENYA.**

BY

DR. CHRISTINE WANJIKU KANGANGI

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REQUIREMENTS FOR THE DEGREE OF MASTER OF MEDICINE IN PEDIATRICS
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STUDENT'S DECLARATION

STUDENT'S DECLARATION

This dissertation is my original work and has not been presented for the award of a degree in any other university.

Dr. Christine Wanjiku Kangangi

Department of Pediatrics and Child Health, University of Nairobi

Signed.....*chw*..... Date.....*11/11/2021*.....

SUPERVISORS' APPROVAL

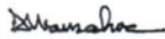
SUPERVISORS' APPROVAL

This dissertation has been presented with our full approval as supervisors:

Professor Dalton Wamalwa (MB ChB, M.Med, MPH)

Associate Professor

Department of Pediatrics and Child Health, University of Nairobi

Signed 

Date 11/11/2021

Dr. Anjumanara Omar (MB ChB, M.Med, C. Endocrinology)

Senior Lecturer

Department of Pediatrics and Child Health

Signed 

Date 11/11/2021

DEDICATION

I dedicate this study to my loving husband (Nyanjui Ndung'u), daughter (Wairimu Nyanjui), my parents and siblings for your unwavering love and support.

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DEFINITION OF TERMS

Screen time - Time spent passively watching screen-based entertainment (TV, computer, mobile devices). Does not include active screen-based games where physical activity or movement is required.

Preschooler - Child aged 3 to 5 years (36.0–60.0 months).

LIST OF ACRONYMS

BMI -Body mass Index

TV -Television

ST -Screen time

WHO -World Health Organization

ABSTRACT

Background: Rapid technological advancement has led to the screen devices being readily available and accessible to many people the world over. This has led to a surge in use of screen media devices (television, computers, tablets, iPad) especially in our homes. The current generation of children is growing up exposed to so much technology, therefore, the advancement of digital technology and increase of its use cannot be ignored. Early childhood high screen exposure has been linked to several harmful effects like obesity, developmental delays as well as bad sleeping habits. Despite the rise of screen media use and the growing concerns of the harmful effects of screen time, there is no adequate data in our set up on screen use among preschool children who are at a critical age of growth.

Objective: This study sought to describe the screen time use of preschool children aged 3-5 years in Nairobi County and the factors associated with the use.

Methods: It was a cross-sectional study. Data was collected from 280 preschool children aged 3-5 years attending selected preschools in Nairobi County. The tool for data collection was an online questionnaire that was self-administered to the parent/guardian or a phone interview for those not able to access the online questionnaire. Descriptive statistics was used to characterize screen time use and univariate and multivariate logistic regression analysis was used to evaluate the association of risk factors with screen time use.

Results: Data of 280 children was analyzed. More than half, 65.4% of all the participants spent more than 1 hour per day in screen time. The median screen time was 107 mins/day (IQR 45-210). Only 97 (34.6%) of the participants met the WHO screen time recommendations. Screen time was associated with Parental screen time ($p<0.001$), age of first screen exposure ($p<0.001$) and the time spent on non-screen-based activities ($p=0.003$).

Conclusion: A large proportion of preschool children aged 3 – 5 years are exceeding the recommended screen time guidelines by the WHO. There is need to raise awareness on the excessive use of screen time among preschool children and inspire focus on interventions to deal with this emerging public health problem.

CHAPTER 1: INTRODUCTION

1.1 Background

Screen time is time that is spent watching television, using computers and mobile devices as well as playing video games (1). Screen devices may include television, video games, smartphones, tablets, iPad and other portable devices like electronic books.

With an increase in new technology, digital screens are readily available and they have become part of our everyday lives. The current generation of children is developing encompassed by so much technology.

Most of the devices are easily accessible and some can be portable from one place to another, especially the hand-held devices like smart phones and tablets. This means that they can be used anywhere.

There has been a rapid digital growth in Kenya with 91% mobile service infiltration compared to 80% mobile service infiltration in Africa. A rate of 84% of the total population has internet access in Kenya (2). This means that there is increased accessibility of mobile devices that contribute to screen time.

1.2 Effects of Screen Time

Screen time use has been associated with some potential positive benefits. Screens can be advantageous for learning in early years. For example, viewing of educational television (TV) programs has been associated with a greater preparedness for school and increase in academic performance that can be traced throughout high school (3, 4, 5). A positive effect on language learning, social conduct and educational awareness has been demonstrated (6). Interactive technology such as electronic books and applications used for learning to read can improve early learning skills by offering alphabetical characters, sounds and words to practice (7). Some types of screen time use like video chatting can improve family bonding as it encourages long distance relatives to stay in touch.

However, there has been a growing concern of the deleterious consequences of prolonged screen time on the health of children. Early childhood high screen exposure has been linked to increased

likelihood of inactive behavior, obesity, bad sleep patterns and abnormalities of development (8, 9)

A systematic review done in 2018 showed there was moderately strong evidence of increased obesity/adiposity among children and young people correlated with screen time (9). Excessive screen media use in preschool children has been associated with an increase in BMI, even though small but significant (10, 11), and this paves the way for later childhood weight gain (12). These associations have been attributed to watching TV while eating and food advertisements exposure (13). This data has been derived mostly from developed countries. On the contrary, a study done in Kenya showed the relationship between the amount of screen time and BMI was non-significant and there was also no considerable relation between fatness of the body and screen time levels (14). The same study also ascertained that children whose level of screen time was high were twice more likely to have an increased intake of fast food and cakes/pastries and 1.8 times more likely to have an increased intake of potato chips (14).

More screen time for children and adolescents has been associated with a later slumber time and reduced average time for sleep (9, 15, 16). During early childhood, the existence of a TV, computer or mobile device in the bedroom is associated with less sleeping minutes every night (17). A study done showed shorter night sleep time in babies exposed to electronic media at night as compared with those without screen exposure (18). This association was attributed to the inhibition of endogenous melatonin by the blue light which is expelled by screens (19) and to content that is arousing (20). Another young adult's research found that reading on a gadget that emits light before sleep time augmented the latency of sleep onset and shortened REM sleep period while reading a print-book had a sleep latency that was 10-min shorter (21). The same study also found that evening exposure to eBooks that discharge light caused an inhibition in melatonin secretion and a delay in the circadian clock (21). Screen devices may also displace the time meant for sleep by children. This is detrimental as sleep is a critical part of growing in a child.

In young children, TV viewing has been linked to cognitive (3, 9, 22, 23) and speech delays (23, 24, 25, 26), and social/emotional delays (27, 28, 29, 30), aggressive behavior (3, 31), and reduced academic performance (32, 33). A recent study found a relation between increased use of

electronic media and lower microstructural integrity of white brain matter tracts that assist language skills and developing literacy skills in children who are in preschool (34).

Screen media replaces other activities in the life of a child such as physical activity and verbal interaction (26, 35). A study done showed there was a 7% decrease in the amount of adult words perceived by the child with each additional hour of television watching and the decrease was even more in the word counts of females (26). Screens can also interfere with interactions of children with parents/caregivers (35) as well as interfere with child play (36) and this limits opportunities for learning and growth. A study done in the US showed that in the presence of a television parents were less inclined to be observant and diligently interact with their children than in the absence of a television (35). Another study done showed that when a mother- child pair watched TV, communication by the mother was less frequent and less responsive in comparison to playing with toys and reading books (37). Another study found that there was less verbal, nonverbal and motivational interactions which were pointed to the child regarding eating associated with the use of a mobile device by the mother (38). A study done in Thailand found that more mother-child contact at age 18 was positively linked to reduced screen time at age 2 and 3(39).

1.3 Problem statement

Due to the growing concerns of the deleterious consequences of too much screen time on children's health, the WHO (1) as well as several other governments (8, 36,37) especially in the developed world have developed screen time guidelines for young children.

WHO in 2019 recommended that for children 3-4 years old screen time should be restricted to 1 hour or less per day(1). In 2016, the American Academy of Pediatrics (AAP), also proposed that for children aged 2–5years screen time should be restricted to 1 hour or less per day of programmes which are of high quality(8). This study will seek to determine the screen time for preschool children between the ages 3 to 5 years old as this is a period of critical brain advancement when interaction with caregivers plays a huge role.

There are no current sedentary behavior guidelines in Kenya, even as opportunities for screen related behaviors are growing. Even with the rapid digital revolution in Kenya, we still do not have adequate data on screen time habits of preschool children and what influences this habits.

Table 1: Summarized Screen Time Guidelines for different countries

	Age	Recommendation
WHO¹	<ul style="list-style-type: none"> • Infants (less than 1 year) • Children 1- 4 year old 	<ul style="list-style-type: none"> • Screen Time (ST) is not recommended • Not more than 1 hour of ST
USA⁸	<ul style="list-style-type: none"> • Children < 18months • Children 18-24 months old • Children 2-5 years old • Children 6 years or older 	<ul style="list-style-type: none"> • No ST other than video-chatting • High quality programming & parents to co-view with the children • Not more than 1 hour/day • Consistent limits on screen time and types of media & make sure not to replace time for adequate physical activity & sleep
Canada⁴⁰	<ul style="list-style-type: none"> • Infants (less than 1 year) & Children less than 2 years • Children 2-4 years old 	<ul style="list-style-type: none"> • ST is not recommended • Not more than 1 hour of ST
Australia⁴¹	<ul style="list-style-type: none"> • Under 2 years • Children 2-5 years old • Children 5-17 years old 	<ul style="list-style-type: none"> • Zero screen time • Less than 1 hour/day • Less than 2 hours/day
South Africa⁴²	<ul style="list-style-type: none"> • Infant less than 1 year • Children 1-5 year old 	<ul style="list-style-type: none"> • Zero screen time • Less than 1 hour per day

CHAPTER 2: LITERATURE REVIEW

2.1 Screen time

Technology today is present almost everywhere at once. Children today are growing up watching their parents/guardians as well as older siblings and other caregivers using technological devices and they want to emulate them. Detrimental effects on health that have been related to too much screen time has led to several studies done to ascertain the use of screen time especially in children.

Preschool children are at a critical age of brain development. Early childhood experiences affect the way the brain develops and can affect future learning, health and behavior. Early-age screen time habits can track over time (43) and predict adverse health outcomes later in life (44).

Rapid technological advancements and easy availability of screen media has led to wide use of digital devices even among preschoolers. There are plenty of studies that have been done especially in more developed countries to evaluate the screen time use among preschool children. A large majority of preschool children are exceeding the advised screen time duration(14, 45-47), that is, up to 1 hour of screen time per day as per the WHO guidelines (1). On the contrary, a study done in Canada showed low levels of screen time among children 0-4 years meeting the recommendations of the screen time guidelines (48).

Most studies done in Kenya have focused mostly on TV viewing without taking into account other forms of screen media. This could possibly be because it's the most common form of screen media and older than other forms. A study done in Juja, Kenya among preschoolers showed that 80.7% of them spent time watching with a greater number of them watching more than 2 hours of TV per day (49). Another study done in Kenya, however among 9–12 year olds showed that 15.5% had high screen time levels (50). Another Kenya study found that about 50% of urban children had about 2 hours per week average screen time compared with less than 10% of rural children (51). This study looked at other forms of screen media apart from the TV, that is, the computer/internet and playing video games.

Total screen time was measured as an average of screen times on weekdays and weekends in hours or minutes per day in several of the studies reviewed (45, 47, 52). Weekends have demonstrated a significantly higher exposure to screen time than weekdays (45, 53). On

weekends, both parents and children showed substantially more screen time than on weekdays (53). The weekend screen time of a child has been significantly and positively correlated to the BMI percentile of the child (54).

Some studies have shown no sex differences in screen time among preschool children (50, 55, 56). On the contrary, there is a study that showed boys were engaged in significantly more screen times than girls and especially in video game time (57).

2.2 Factors influencing screen time

Exposure to screen media is happening at a very early age. In studies done, by 2 years of age most children have interacted with a screen media device (45, 46), whether it is television viewing, smart phone or tablet. Early childhood (0-5years) is a key period for molding healthy behaviors and when habits start to be formed which can be tracked to adulthood (43). Early exposure to prolonged screen time at 24 months predicted lower developmental scores at 36 months, and similarly increased screen time at 36 months was also related to lower developmental results at 60 months (58).

Availability of cheaper technology has increased accessibility to screen media devices in our homes as many people can afford to buy devices like smart phones, laptops or iPad. Presence of the screen media devices in the home makes it easier for children to utilize the devices. Having multiple devices in a home increased the likelihood of high screen time in children (45, 55, 59).

The existence of electronic screen gadgets in the bedroom influenced screen time for a child (45, 59, 60). A TV within the bedroom has been shown as a positive screen time predictor among young children (14). A study done in the USA found that about 75% of children have 1 technological device in their bedrooms with TV being the most common media (61). A study done in Kenya among 9–12yearolds showed that 75.9% of the children that had a moderate to high screen time levels had a TV in their bedroom (50). In that study, a huge proportion of children taking part admitted to having a TV in the bedroom. This was more common in children of low socioeconomic status owing to the fact that a good number of them sleep in the living room at night where the TV is usually kept (50).

A huge proportion of a child's experiences can be attributed to the parents or the primary caregiver. Children are more prone to have a greater use of screen media if the parents also have

a high screen media use (55, 62, 63). A study done in rural western India showed that households where there was smartphone usage by the mother increased odds of the children's screen time two-folds (45). Another study done in the USA found that parents of a diminished socioeconomic standing were more prone to watch TV/DVDs with their children (60).

Parents have a central role in regards to screen time for a preschool child and are key when considering ways to minimize screen time. Parental attitudes and barriers have been reported to be positive predictors of the use of screen time by children (14). Parents give various reasons for giving devices to their children including to keep them calm or to enable them to do chores at home (46). Some parents believe children like watching TV and they don't express worries about their child's TV viewing (64). A parental worry about a child's exercise and passive activities has been positively related with the screen time for girls (51). In a study done across six European countries using focus group discussions among parents, education was cited as the key benefit for children watching TV (64).

For households where screen time rules are followed, preschoolers are less likely to exceed screen time recommendations (56, 65). Parents having no rules governing TV viewing has been shown as a determinant of TV viewing in children (59). Parent self-efficacy in order to reduce screen time has been inversely related to a child's screen time (54)

Low parental income and parental education has been associated with increased use of screen time among children (14, 47). According to a study done in the US, children from homes with a lower income had a substantial access to screens in their bedrooms compared to children from homes with a higher income (60). Children of low socioeconomic standing engaging in higher screen time than those of high socioeconomic standing has been attributed to less recreational facilities and after-school activities in their communities as well as perceived lack of safety in poor neighborhoods (57). A study done in Kenya showed both children in low socioeconomic status and high socioeconomic status had recreational screen time and that students from private school had significantly more screen time than those from public schools (50).

A study done in Australia showed that paternal schooling was strongly linked to the screen time for girls while there was no association to the boys' screen time (56). Another study done in the Netherlands showed that children who had both parents with higher education viewed 25% fewer

hours of TV than those children who had parents with no higher education and those with one parent who was highly educated (66).

A higher screen time has been shown among children who receive care at home, either by a caregiver or a family member as compared to children in center-based care like a daycare center or play group (52, 67).

A systematic review done for children between zero and 8 years of age found that the use of mobile screen gadgets was greater in children who have stay-at-home parents than those with working parents (55). A study done in rural India showed there was no relation between a mother's occupation and the child's screen time (45). Another study found that time spent on a mother's job was linked positively to the child's screen time (68).

This research sought to determine the screen time among preschool children in our local context and factors that influence this behavior.

Table 2: Literature Review on Screen Time

AUTHOR/YEAR/COUNTRY/ SOURCE	STUDY TITLE	STUDY DESIGN &SAMPLE	SCREEN TIME MEASUREMENT (ST)	MAIN FINDINGS
Shar et al, 2019, INDIA ⁴⁵ Journal of Family Medicine and Primary Care	Screen time usage among preschoolers aged 2-6 in rural Western India: A cross-sectional study	Cross-sectional study n =379 preschool children 2-6 years old	Weekday & weekend screen time per device	<ul style="list-style-type: none"> • >80% of children exceeded the advised screen time • 87.2% started screen use by the age of 3 • Households with three devices and Smartphone usage by mothers increased the odds of screen time by 60% and two-folds respectively
Lin et al, 2019, SINGAPORE ⁶⁹ Journal of Developmental & Behavioral Pediatrics	The relationship among screen use, sleep, and Emotional/Behavioral difficulties in preschool children with Neurodevelopment disorder	Cross-sectional study n =367 Children <6 years old	<ul style="list-style-type: none"> •Child’s average daily screen time, hr. •No. of screen devices •Age of 1st screen exposure 	<ul style="list-style-type: none"> •Average screen use duration 3.92 hrs. •93.9% of children exceeded 1 hour of screen time daily. •57.75 of the children had screen devices available in their bedrooms •52% began screen use at 18 months or earlier
Chen et al, 2019, USA ⁴⁷ JAMA Pediatrics	Assessment of Screen Exposure in Young Children, 1997 to 2014.	Cohort study n = 1327 in 1997 n = 443 in 2014 Age groups: 0-2 yrs& 3-5 yrs	<ul style="list-style-type: none"> • Mean daily screen time in hour in a typical week • Diary data used 	<ul style="list-style-type: none"> •1997 -daily ST averaged 1.32 hours -0-2 yr olds and 2.47 hrs for 3-5yr olds •2014 rise in ST for 0-2yr olds to 3.05hrs, No significant change for the 3-5 year olds •TV was allocated the highest ST •There was a low screen time use among children from high income families
Wachira et al, 2018, KENYA ⁵⁰ PLOS ONE Journal	Screen-based sedentary behavior and adiposity among school children: Results from International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE) – Kenya	cross-sectional study part of a multinational study conducted in 12 countries n =563 children aged 9 to 11 years	<ul style="list-style-type: none"> • Average screen time on weekdays • Average screen time on weekend • Average daily screen time • Total hours in a week spent on screen-based activities 	<ul style="list-style-type: none"> • 15.5% had high ST levels • 67.9% spent no > 2 hours in recreational screen activities on school days • 74.2% did not meet the guidelines on weekend days.

<p>Carson et al, 2013,CANADA⁴⁸ Journal of Pediatrics & Child Health</p>	<p>The Canadian Sedentary Behavior Guidelines for the Early Years (zero to four years of age) and screen time among children from Kingston, Ontario.</p>	<p>Cross Sectional study n =657 Age 0 – 4 years</p>	<ul style="list-style-type: none"> •Average ST in a weekend and on a weekday •Age of 1st use of screen devices •Parental attitudes & barriers to reducing the child's ST 	<ul style="list-style-type: none"> •32% of children ≤2years engaged in no screen time •46% of children 2-4 years had <1 hour per day of ST •Most parents thought their child wasn't engaged in excessive ST
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STUDY JUSTIFICATION

The advancement of digital technology and its wider use cannot be ignored. With increasing evidence of the harmful consequences of screen time in young children, it is important to understand screen use and factors influencing it in our local context.

The study will help to inform on the usage of screen time among preschool children in our local context.

This study will help to inform future research for understanding the determinants of screen time usage and ways to engage parents/guardians in enforcing screen time restrictions during early childhood period.

RESEARCH QUESTION

What is the screen time usage and associated factors among preschool children aged 3-5years in Nairobi County?

OBJECTIVES

Broad objective

To describe screen time use by preschool children aged 3-5 years in Nairobi County and determine associated factors

Primary Objective

- To describe the screen time use of preschool children aged 3-5 years in Nairobi county

Secondary Objective

- To determine factors associated with screen time usage among preschool children aged 3-5years in Nairobi County.

CHAPTER 3: METHODOLOGY

3.1 Study Design.

This was a Cross-sectional study design. The study was carried out between February 2021 and April 2021. This study was conducted during the Covid-19 pandemic, of note is that the data was collected during the school period when students had resumed face to face learning. The method used was quantitative. It was conducted through online self-administered questionnaire sent to the parents/guardians of the preschool children selected to participate in the study. Descriptive statistics was used to characterize screen time exposure and univariate and multivariate logistic regression analysis was used to evaluate the association of risk factors with screen time exposure.

3.2 Study Setting.

The study was conducted in selected preschool institutions/kindergartens both private and public in Nairobi County. Nairobi County is one of the 47 counties in Kenya and the capital city of Kenya. It is cosmopolitan and mainly urban in settlement. It has an area of approximately 703km² with a total population of about 4.397 million as per the 2019 census (70). The population of children aged 3 years and 4 years in Nairobi is 196, 213 as per the 2019 census (71). The county has 11 sub counties: Dagoretti, Embakasi, Kamukunji, Kasarani, Kibra, Lang'ata, Makadara, Mathare, Njiru, Starehe and Westlands. As of 2016, Nairobi County had 2069 ECD schools (217 being public and 1852 private) with an average school size of 101 pupils (61 pupils in public and 106 in private) (72). According to the 2019 census, mobile phone and TV ownership in Nairobi was 69.1% and 68.7% respectively of the population (73).

3.3 Study Population

The study population had 280 preschool children aged 3 to 5 years.

3.3.1 Inclusion Criteria

- Preschool Child aged between aged 3 - 5yrs
- Children whose parents gave consent to participate in the study

3.3.2 Exclusion criteria

- Preschool child age less than 3 years or older than 5 years
- Parents who did not give consent

3.4 Sample Size Calculation

The Fischer's formula was used to calculate the sample size:

$$n = \frac{Z_{\alpha/2}^2 p (1-p)}{}$$

d^2

Where

n = estimated sample size

Z_{α} = standard normal deviate for 95% CI (1.96)

p = Proportion of screen time use among preschool children. P= 0.5. This estimate was determined from a study done previously that showed that 50% of urban children had more than 2 hours of screen time (51)

d = level of precision (set at 0.058)

$Z_{\alpha} = 1.96$

$n = (1.96)^2 \times 0.5 (1-0.5)$

$(0.058)^2$

n = 285

The study was an online survey, therefore, non-response was expected from the people who received the questionnaires. A response rate of 50% was expected. Therefore, to cater for the non-response, more questionnaires were distributed to be able to reach the required sample size.

3.5 Sampling Methods.

Multistage stratified sampling technique was used to select the required sample size. In stage one, from the eleven sub counties in Nairobi County, 4 sub-counties with the highest number of preschool children were purposively selected. These included Embakasi, Kasarani, Njiru and Dagoretti sub-counties. The sample size of the preschool children was then divided among the four sub-counties based on the proportion of preschool children in each sub-county to the size of the population of preschool children in the four sub-counties.

In stage two, schools were randomly selected from the four sub-counties using random numbers to make a total of sixteen schools. Four schools were randomly selected from each of the four sub-counties. Of the four schools in each sub-county, two schools were public schools and the other two were private schools. Each of the schools was randomly selected as long as they met the threshold of fifty or more students in that particular school. If a school refused to participate in the study it was replaced with the next randomly selected school

from the same sub-county. Schools were selected from a list of schools provided by the Ministry of Education Nairobi County.

In stage 3, selection of number of children in each school was based on the enrollment size of the preschool (3–5year-olds) children in the school. One classroom with children in that age group was identified and selected. The children were randomly selected from a list of names offered by the class teacher. The principal investigator then got in touch with the parents via phone only after permission was granted permission by the school and the class teacher had already informed the parents about the study.

Parents/guardians contacted to participate in the study were given an option to answer the questionnaire through an online link or via telephone interview. If a parent did not give consent to participate in the study, random selection was carried out again from the class list among those not selected in the first round to replace the child.

3.6 Study Variables

3.6.1 Dependent variable:

Screen time usage of the preschool child in hours per day

3.6.2 Independent variables:

- Sociodemographic characteristics of child and parent
- Parental screen time usage
- Screen time devices available at home/ in room
- Child behavior
- Parental attitudes and barriers
- Parental education
- Household income
- Type of school: private or public
- No. of rooms in the house (socioeconomic status)

3.7 Study Tools

The data was collected by use of a predesigned and pretested self-administered questionnaire distributed to the parents/guardians. The questionnaire was in English language.

The questionnaire had questions on Sociodemographic characteristic of the child and parent, physical/environment (screen devices in the home), Screen time and factors associated with screen time.

The specific questions on screen time were “Over the past month, on average, about how many hours per day did your child usually spend engaged in the following activities: Watching TV/Video shows/DVDs, Using Mobile phone (watching videos/playing games/using internet), Using a computer/Tablet (playing games/using internet) and Playing Video games (play station, Xbox, Wii). This was assessed for weekends (Saturday morning to Sunday Evening) and weekdays (Monday Morning – Friday Evening) as two separate questions. These types of questions have been used in other similar studies to ask about screen time (14, 74). A question was also be asked on how much of that screen time is spent on school work (homework/online classes). For the parental screen time it included screen time spent on work related activities and time spent on social media platforms like Face book, Instagram or twitter. Screen-time was summed and the mean screen-time (hours per day) was calculated. The average daily screen time was calculated as: $([\text{Screen time on weekdays} \times 5 \text{ days}] + [\text{Screen time on weekends} \times 2 \text{ days}])/7 \text{ days}$. Screen-time was then categorized into ‘<1 h/day’ and ‘ ≥ 1 h/day’ based on the WHO screen-time recommendation for children aged 2–5 years.

To assess the time spent on non-screen-based activities, the parent/guardian was asked how much time his/her child spent playing outdoors, Reading/Being read to a book (not electronic), Play using traditional toys/activities e.g., dolls, toy car and Playing with other siblings and/or friends on a typical weekday and on a typical weekend day. The total time spent on these activities was summed up and the mean non-screen-based time per day was calculated as $([\text{hours/weekday} \times 5] + [\text{hours/weekend day} \times 2])/7$. The non-screen-based time was then categorized into ‘<3 h/day’ and ‘ ≥ 3 h/day’.

To assess the age of 1stscreen exposure, the parent/guardian was asked ‘At what age did your child start watching television or playing video/computer game?’

The questionnaire also included questions on: If their child ate meals while engaging in screen devices (e.g. watching TV), sleep duration of the child (parents/guardian were asked the time the child slept and time child woke up on a typical weekday) and Parents co-viewing of screen devices together with the child. Parents/guardians were also asked if their children made requests to use any of the screen devices, whether they had any house rules regarding use of screen devices and if they worried about the amount of time their children spent on screen devices.

3.8 Study Procedures

Once approval was granted to do the study, the principal investigator visited each of the schools selected to meet the principal/head teacher for an introduction and discuss what the study pertains. If the principal agreed for the school to participate in the study, then recruitment of study participants was done.

The children were randomly selected from a list of names offered by the class teacher. The principal investigator then got in touch with the parents via phone only after the class teacher had already informed the parents about the study.

Parents/guardians contacted to participate in the study were given an option to answer the questionnaire through an online link or via telephone interview. Those not able to fill an online questionnaire were contacted for a telephone interview. The option of phone interview consent and interview was made available and made clear so that parents/guardians could choose right early. The online questionnaire was sent to the parents/guardians via WhatsApp or email. The parents/guardians filled an online informed consent before proceeding to answer the questions.

The questionnaires were checked for completeness, accuracy and consistency at the end of each day of data collection. Data was then be entered into SPSS Statistical Package (SPSS Inc. Version 21.0) for data analysis. After entry, data was cleaned to remove any inconsistencies and correct for any data entry errors. The data was then analyzed.

3.9 Data Management

Data was collected by the Childs' parent/guardian online using a self-administered structured questionnaire or via telephone interview.

Data entry was then retrieved and imported and analysis performed using SPSS version 21.0 software. Descriptive analysis was performed to determine proportions in all the variables. This was summarized into frequency tables and charts. For continuous variables, means and standard deviations was done, while univariate analysis using the Chi square test was used to test for association between the independent and dependent variables. A Multivariate analysis was done to examine association between independent and dependent variables to show a statistically significant association on univariate analysis. A p-value of <0.05 was considered significant.

3.10 Ethical Considerations

Approval was sought from the Kenyatta National Hospital/University of Nairobi (KNH/UON) Ethics board, the National Commission for Science, Technology and

Innovation (NACOSTI) and the Ministry of Education Nairobi County. Permission was also sought from the individual preschools that were selected to participate in the study.

Consent was obtained from the parents before filling in of the questionnaire. Participation in the study was voluntary and no child/parent was victimized for refusal to take part in the study.

Confidentiality of the information collected was maintained by use of a unique identifier for each participant. Each school was given a specific code and each had a specific code together with their initials.

CHAPTER 4: RESULTS

A total of 280 forms were completed. Figure 1 below shows the screening and enrollment process.

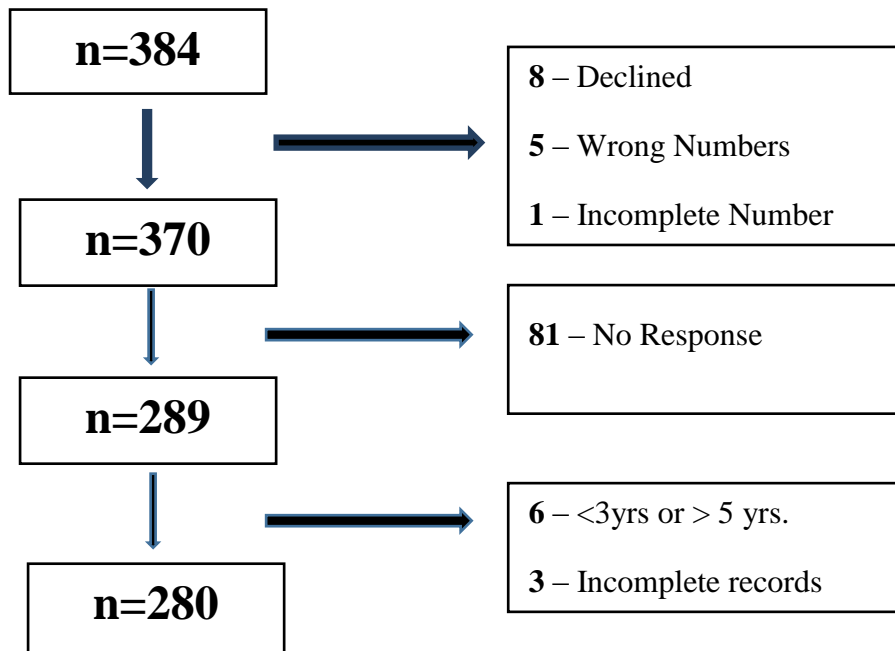


Figure 1: Screening and enrollment into the study

4.1 Demographic Characteristics of the Child and Parent/Guardian

Table 3 below shows a summary of the demographic characteristics of the child and of the parent/guardian filling in the questionnaire. A majority (50.4%) of the children were 5 years old, with a median age of 5 (IQR 1.0). Almost half (50.7%) of the participants were male and mothers made up 70 % of the parent/guardian who filled in the questionnaire. More than half, 65.7% of the parents/guardians filling were had college education and above. 73.2% of the participants attended public school with a majority (73.6%) paying less than 10000 Kenyan shillings of school fees per term. A majority (75.7%) of the participants had siblings. The average number of people in a household was 4.7 (SD 1.31).80.2 % of the participants lived in a two-parent/guardian household. About 29.3% of participants lived in households with an income of less than 10000Ksh, while 27.1% had household income of more than 50000 Kenyan shillings.

Table 3: Sociodemographic Characteristics of the Child and Parent/Guardian

Characteristic	Frequency (%) n=280;	
Age	Median (IQR)	
3 - <4yrs	60 (21.4%)	5.0(1.0)
4 - <5yrs	79 (28.2%)	
5yrs	141 (50.4%)	
Gender		
Female	142 (49.3%)	
Male	138 (50.7%)	
Parent/Guardian		
Mother	196 (70%)	
Father	78 (27.9%)	
Guardian	6 (2.1%)	
Level of Education of Parent/Guardian		
None	4 (1.4%)	
Primary	35 (12.5%)	
Secondary	57 (20.4%)	
College	96 (34.3%)	
University	88 (31.4%)	
School		
Public	205 (73.2%)	
Private	75 (26.8%)	
School Fees per term		
<10000	206 (73.6%)	
10000-49999	55 (19.6%)	
≥50000	19 (6.8%)	
Siblings		
Yes	212 (75.7%)	
No	68 (24.3%)	
No. people in a household		Mean (SD)
2-3	40 (14.3%)	4.7 (1.31)
4-5	176 (62.9%)	

6-7	57 (20.4%)
≥8	7 (2.5%)
Family Structure	
Single Parent/Guardian	55 (19.6%)
Two Parent/Guardian	225 (80.4%)
Household Income	
Less than 10000	82 (29.3%)
10000-19999	46 (16.4%)
20000-29999	37 (13.2%)
30000-39999	26 (9.3%)
40000-49999	13 (4.6%)
50000 or more	76 (27.1%)

4.2 Screen Devices in a household

Table 4 below shows a summary of the screen devices in a household. A majority (85.4%) of participants had at least 1 television in their household with 6.8% having no television. Almost half, 47.5% had no computer with 35.7% having at least one computer. Most (86.8%) of the households had a smartphone with 24.3% of them having 3 or more smartphones. About half (49.7%) had a basic phone. Only 10.3% had a videogame system while only 26.7% had a tablet/iPad in their household.

Table 4: Types of Screen devices in a household

Type of devices in a household	
Television	
0	19 (6.8%)
1	239 (85.4%)
2	18 (6.4%)
≥3	4 (1.4%)
Computer (including Laptop)	
0	133 (47.5%)
1	100 (35.7%)
2	36 (12.9%)
≥3	11 (3.9%)

Smartphone	
0	37 (13.2%)
1	70 (25.0%)
2	105 (37.5%)
≥3	68 (24.3%)
Basic Phone	
0	141 (50.4%)
1	106 (37.9%)
2	31 (11.1%)
≥3	2 (0.7%)
Videogame system	
0	251 (89.6%)
1	27 (9.6%)
2	2 (0.7%)
Tablet/iPad	
0	205 (73.2%)
1	62 (22.1%)
2	13 (4.6%)

A majority, 60% of households had four or more screen devices with a median of 4 devices (IQR 3-6). The total number of devices included all the available screen devices in a household (TV, computer, smartphone, basic phone, videogame system and tablet/iPad).

Table 5: Total no. of Screen Devices in a household

Total no. of devices in a household		
	Frequency (%) n=280	Median (IQR)
1	13 (4.6%)	4(3)
2	40 (14.3%)	
3	59 (21.1%)	
≥4	168 (60%)	

Table 6 below shows that 24.6% of the participants had a TV in the same room where they slept. Only 5.4% had a computer in the same sleeping area. 34.3% and 21.1 % had a smartphone and a basic phone respectively in the same room where they slept. Very few participants had a videogame system (2.1%) or a tablet/iPad (7.5%) in their sleeping area. 1.4% of the participants reported to have other devices like a radio in their sleeping area.

Table 6: Devices in the same room where child sleeps

Devices in the same room where child sleeps	
	Frequency (%) n=280
Television	
Yes	69 (24.6%)
No	211 (75.4%)
Computer (including Laptop)	
Yes	15 (5.4%)
No	265 (94.6%)
Smartphone	
Yes	96 (34.3%)
No	184 (65.7%)
Basic Phone	
Yes	59 (21.1%)
No	221 (78.9%)
Videogame system	
Yes	6 (2.1%)
No	274 (97.9%)
Tablet/iPad	
Yes	21 (7.5%)
No	259 (92.5%)
Other	
Yes	4 (1.4%)
No	276 (98.6%)

4.3: Screen Time

Table 7 shows results analysis on child's screen time. On average, the participants spent about 180 minutes (3 hours) per day in screen time during the weekdays and about 195

minutes (3.25 hours) per day on weekend days. The average screen time per day (includes both weekday and weekend) was 107 minutes (1.78hours). A majority (57.9%) of the participants spent more than 1 hour in screen time on weekdays while, most (69.3%) of the participants had more than 1 hour of screen time on weekend days. Overall, most (65.4%) of the participants spent more than 1hour in screen time.

Table 7: Screen Time of the Child

	Frequency (%) n=280; Median (IQR)	
Total screen time weekday (minutes/day)		
1hr or less screen time	118 (42.1%)	180 (386.25)
>1hr screen time	162 (57.9%)	
Total screen time weekend (minutes/day)		
1hr or less screen time	86 (30.7%)	195 (360)
>1hr screen time	194 (69.3%)	
Weekday +weekend screen time (minutes/day)		
1hr or less screen time	97 (34.6%)	107.14 (165)
>1hr screen time	183 (65.4%)	

The screen device/gadget with the highest screen time was the television with an average screen time per day as 181.62 mins (SD 161.03) spent watching TV/videos. This was followed by the mobile phone (Mean 82.09, SD 119.77), then the computer/Laptop/ipad (Mean 39.80, SD 104.09) and lastly the videogame systems (Mean 10.51, SD 32.28). The average screen time spent on school related activities (online classes, homework) was 35.36 mins (SD 47.11) per day.

4.4 Age of first screen exposure

Table 8 shows that a majority (71.3%) of participants had been introduced to screens (watching television or playing video/computer games) before 3 years of age with a median age of 2yrs (IQR 1-3).

Table 8: Age of 1st screen exposure

	Frequency (%) n=280	
Age of 1st Screen exposure	Median (IQR)	
None/No exposure	7 (2.6%)	2.0 (2.0)

<1 year	30 (11.0%)
1 to <2 years	83 (30.5%)
2 to <3 years	81 (29.8%)
≥3years	71 (26.1%)

4.5 Parental Screen Time

Table 9 shows that a majority (78.6%) of parents spent 60 minutes (1 hour) or more in screen time per day with an average screen time of 207 minutes (IQR 75 - 452) per day.

Table 9: Parental Screen Time

Parental Screen Time (minutes/day)	Median (IQR)
>60minutes	220 (78.6%) 207.86 (377.14)
≤60minutes	60 (21.4%)

The screen device/gadget with the highest screen time among the parents/guardians was the mobile phone with an average screen time per day of 143.84 mins (SD180.53). This was followed by the television which contributed to an average screen time per day of 137.68 (SD 141.36), then the computer/laptop/ipad (Mean 69.64, SD142.15) and lastly the videogame system (Mean13.17, SD58.03).

The parents/guardians spent an average screen time of 136.67 mins (SD176.70) per day on social media (Facebook, messenger, Twitter, whatsapp, snapchat, instagram). The average screen time spent on work-related tasks (online meetings/webinars/writing reports/internet) was 104.3 mins (SD 167.56) per day, with more time spent on work during the weekday (Mean 64.13, SD103.16) than on the weekend (Mean 40.13, SD82.29).

4.6 Eating meals while using screen devices

About one third, 32.1% of the participants ate their meals while using a screen device while, a few 12.1% always ate their meals while using screen devices. Only 13.9% reported to never having their meals while engaging in screen media use.

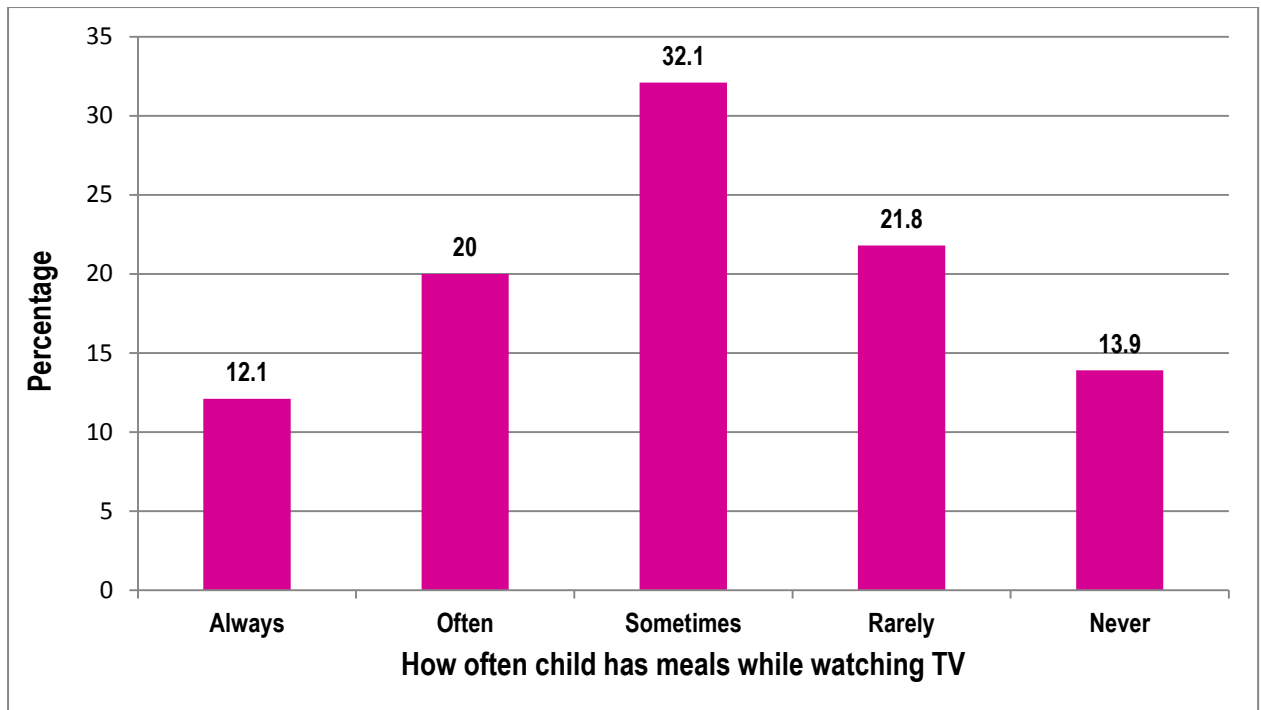


Figure 2: Eating meals while watching TV/videos or playing videogames using a computer or mobile device

4.7 Reasons given by parents/Guardian for allowing children access to screen devices

Parents/guardians were asked to rate reasons for giving screen devices to their child. As shown in figure 3, most (56.8%) of the parents disagreed giving their child screen devices to calm them down.

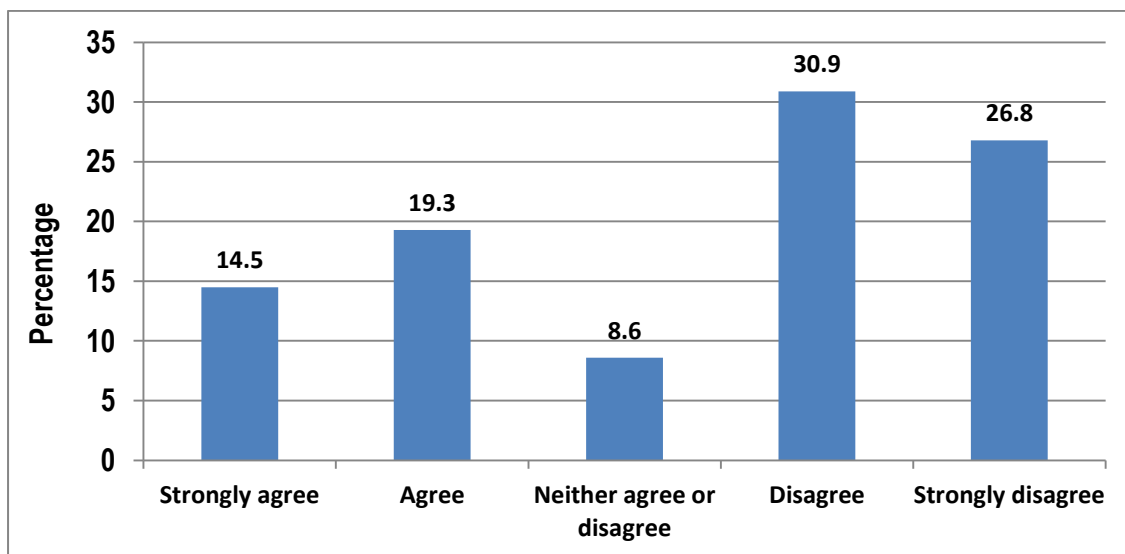


Figure 3: To calm down the child

Figure 4 shows that a majority (58.8%) of the parents disagreed to giving their child devices so as to enable them do household chores, while 34.8% strongly agreed or agreed to giving their children devices.

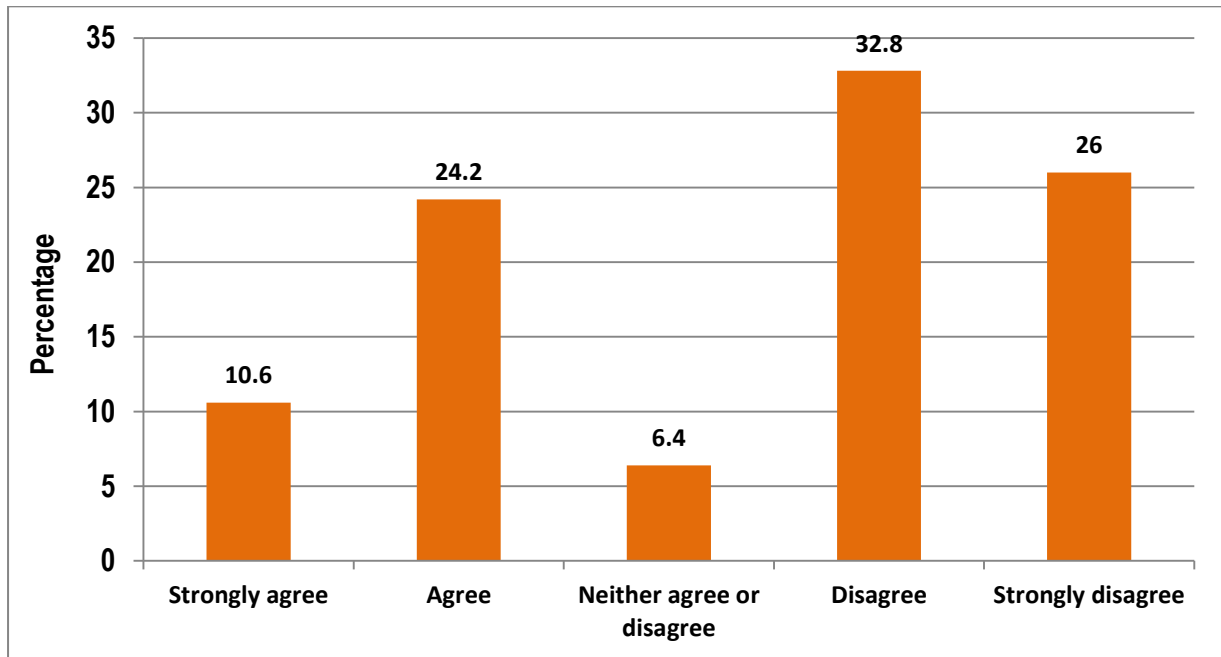


Figure 4: To be able to do house chores

Figure 5 shows that a majority (72.6%) gave screen devices to their children for entertainment purposes.

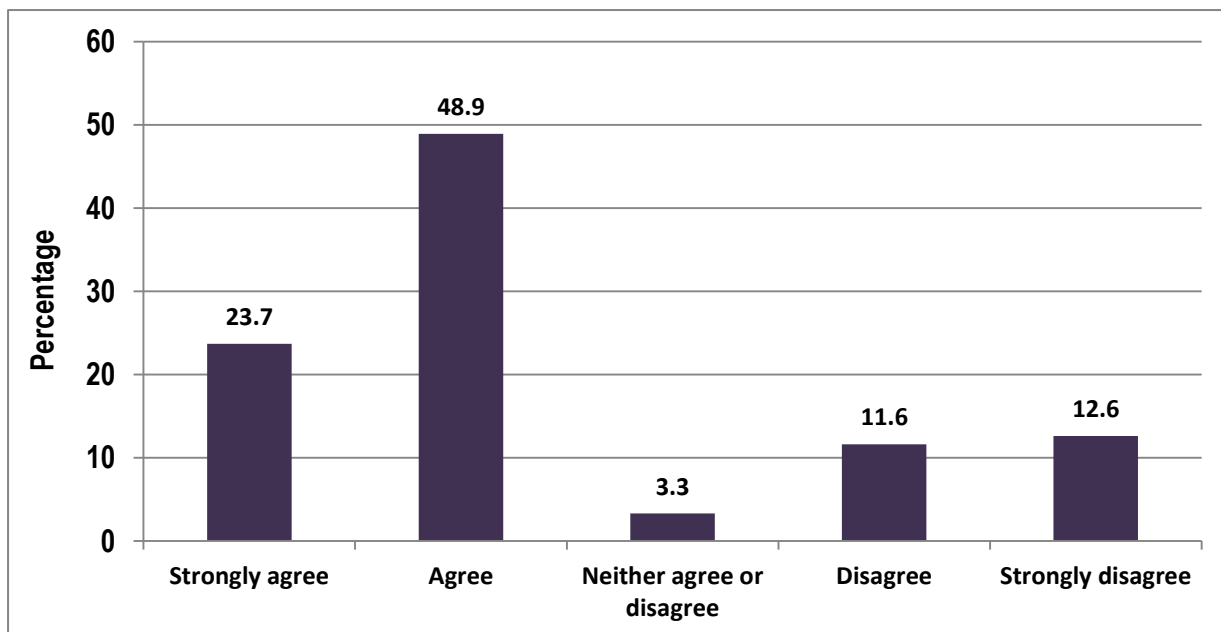


Figure 5: A form of entertainment

Figure 6 shows that 72.9% of the parents gave their children screen devices for purpose of educating them.

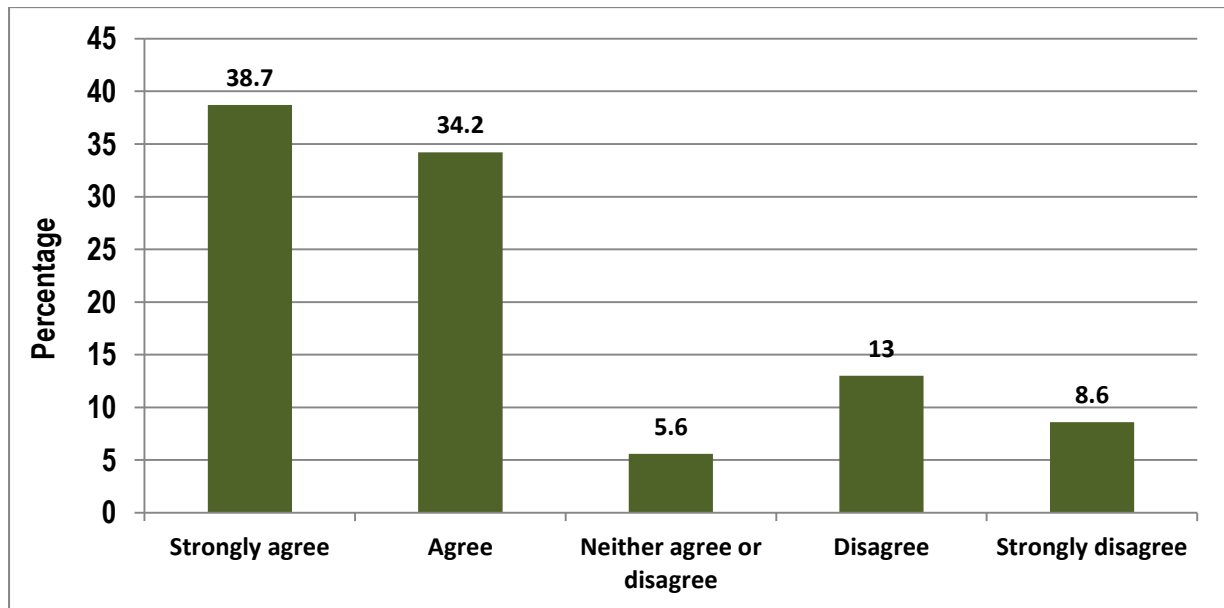


Figure 6: For education services

Table 10 below shows that preschool children who participated in the study had a mean sleep time of 9.85 hours. A majority (80.7%) of the child co-viewed screen devices with their parents with television (64.6%) being the device most commonly used together by parents and their children. 78.9% of the participants made requests to their parents to use their phone or any of the screen devices. A majority (68.9%) of parents reported to have no household rules regarding screen use while 66.1% of the parents said they worried about the amount of time their children spent on screen devices.

Table 10: Child Behaviour and Parental Behaviour

	Frequency (%) n=280	
Sleep duration	Mean (SD)	
Less than 10 hrs.	141 (50.4%)	9.85(1.16)
≥ 10hrs	139 (49.6%)	
Use of screen devices together with child (co-viewing)		
Yes	226 (80.7%)	
No	54 (19.3%)	
Device most commonly used together with		

child	
TV	181 (64.6%)
Computer (including laptop)	11 (3.9%)
Mobile phone	40 (14.3%)
Tablet/iPad	4 (1.4%)
None	44 (15.7%)
Request to use phone/any screen media device	
Yes	221 (78.9%)
No	59 (21.1%)
Household rules regarding screen use	
Yes	193 (68.9%)
No	87 (31.1%)
Parental Worry about child's screen use	
Yes	185 (66.1%)
No	95 (33.9%)

4.8 Bivariate Analysis

4.8.1 Screen Time in relation to Sociodemographic Characteristics

Table 10 below shows the results analysis of the Sociodemographic factors association with screen time. Level of education of the parent/guardian is the only Sociodemographic factor with a significant association with screen time (OR 0.21 [95% CI 0.10-0.43]; $p < 0.001$). A high proportion of children whose parents/guardians had post primary education had more than 1 hour of screen time (70.5%) then those (33.3%) of parents with primary school or lower education level.

Children aged between 3 to <4 years had a high screen time of more than 1 hour (70%) as compared to those aged between 4-5 years (64.1%) but there was no statistically significant association. Children with no siblings had a higher proportion of screen time of more than 1 hour (72.1%) when compared to those with siblings (63.2%) but there was no statistically significant association. Children living in a household with six or more people had a higher proportion of screen time (70.3%) compared to those living in household with 2-5 people (63.9%) but there was no statistically significant association.

Children whose father or guardian filled in the questionnaire had a higher screen time (73.8%) compared to those whom the mother filled in the questionnaire (61.7%). The other sociodemographic characteristics had no significant association with screen time.

Table 11: Association of screen time with Sociodemographic characteristics

Variables	>1hr of Screen Time (n=183)	≤1hr of Screen Time (n=97)	OR (95%CI)	P-value
Age				
3 - <4yrs	42 (70.0%)	18 (30.0%)	1.31(0.71 - 2.42)	0.394
4 - 5yrs	141 (64.1%)	79 (35.9%)		
Gender				
Female	91 (64.1%)	51 (35.9%)	0.89 (0.55-1.46)	0.650
Male	92 (66.7%)	46 (33.3%)		
Relation to child				
Mother	121 (61.7%)	75 (38.3%)	0.57 (0.33-1.0)	0.052
Father, Guardian	62 (73.8%)	22 (26.2%)		
Level of Education of parent/Guardian				
Primary school or Lower	13 (33.3%)	26 (66.7%)	0.21 (0.10-0.43)	<0.001
Post Primary	170 (70.5%)	71 (29.5%)		
School				
Private	48 (65.8%)	25 (34.2%)	1.0 (0.58-1.79)	0.952
Public	134 (65.4%)	71 (34.6%)		
School Fees per term				
<50000	170 (65.1%)	91 (34.9%)	0.86 (0.32-2.34)	
≥50000	13 (68.4%)	6 (31.6%)		
Siblings				
No	49 (72.1%)	19 (27.9%)	1.5 (0.83-2.73)	0.182
Yes	134 (63.2%)	78 (36.8%)		
Household size				

(people per household)				
≥6	45 (70.3%)	19 (29.7%)	1.34 (0.73-2.45)	0.343
2-5	138 (63.9%)	78 (36.1%)		
Family Structure				
Single parent/guardian	37 (67.3%)	18 (32.7%)	1.11(0.60- 2.08)	0.739
Two parent/guardian	146 (64.9%)	79 (35.1%)		

4.8.2 Screen time association with Screen devices in the household

Table 11 below shows that participants having four or more screen devices in a household (74.4%) were more likely to have a higher screen time of more than 1 hour as compared to those who had less than four devices (51.8%). This was statistically significant (OR 2.71 [95% CI 1.63-4.50]; $p < 0.001$).

Having a computer in the same room where the child sleeps had a high likelihood of more than 1 hour of screen time (86.7%) but it was not statistically significant. Having a smartphone in the same room where child sleeps was associated with a higher screen time of more than 1 hour (72.9%) than those with no smartphone in their sleeping area but there was no statistically significant association. Presence of a TV, basic phone, videogame system and tablet/iPad showed no association with screen time.

Table 12: Association of Screen Time with screen devices in the household

Variables	>1hr of Screen Time (n=183)	≤1hr of Screen Time (n=97)	OR (95%CI)	P-value
No. of devices in household				
≥4	125 (74.4%)	43 (25.6%)	2.71 (1.63-4.50)	<0.001
<4	58 (51.8%)	54 (48.2%)		
Device where child sleeps				

TV				
Yes	39 (56.5%)	30 (43.5%)	0.61 (0.35-1.06)	0.076
No	144 (68.2%)	67 (31.8%)		
Computer				
Yes	13 (86.7%)	2 (13.3%)	3.63(0.80-16.43)	0.075
No	170 (64.2%)	95 (35.8%)		
Smartphone				
Yes	70 (72.9%)	26 (27.1%)	1.69 (0.99-2.90)	0.055
No	113 (61.4%)	71 (38.6%)		
Basic Phone				
Yes	33 (55.9%)	26 (44.1%)	0.60 (0.33-1.08)	0.087
No	150 (67.9%)	71 (32.1%)		
Videogames				
Yes	3 (50.0%)	3 (50.0%)	0.52 (0.10-2.64)	0.424
No	180 (65.7%)	94 (34.3%)		
Tablet/iPad				
Yes	14 (66.7%)	7 (33.3%)	1.07 (0.42-2.73)	0.896
No	169 (65.3%)	90 (34.7%)		

4.8.3 Screen Time association with Child related factors

Table 12 shows results of screen time association with child related factors. Age of 1st screen exposure (age when child was introduced to screen devices) had a significant association with screen time (OR 0.32 [95% CI 0.18 – 0.56]; p<0.001). Children first introduced to screens before 3 years of age had a higher proportion (74.1%) of screen time than those introduced after 3 years of age (47.9%).

A high screen time of more than 1 hour/day was found in children who always or often had their meals while using screen devices (78.9%) as compared to those who never, rarely or sometimes had their meals while using screen devices (47.9%). This association was statistically significant (OR 2.60 [95% CI 1.45-4.67]; p=0.001).

Children who spent 180 minutes/day (3hours) or more engage in other activities which were not screen based (73.2%) had a high screen time of more than 1 hour/day than those who were engaged in less than 180 minutes/day (56.5%). This was also statistically significant (OR 0.48 [95% CI 0.29-0.79]; p=0.003).

Children who made requests to use a phone or any screen media device (71.9%) had a screen time of more than 1 hour/day as compared to those who did not make requests to use a phone or any screen media device (40.7%). This was also statistically significant (OR 3.74 [95% CI 2.06-6.79]; <0.001). There was no significant association between sleep duration and screen time.

Table 13: Association of Screen Time with factors related to the child

Variables	>1hr of Screen Time (n=183)	≤1hr of Screen Time (n=97)	OR (95%CI)	P-value
Age of 1st Screen exposure				
≥3years	34 (47.9%)	37 (52.1%)	0.32 (0.18-0.56)	<0.001
<3years	149 (74.1%)	52 (25.9%)		
Eating meals while using screen devices				
Always, Often	71 (78.9%)	19 (21.1%)	2.60 (1.45-4.67)	0.001
Never, rarely, sometimes	112 (58.9%)	78 (41.1%)		
Sleep Duration				
<10 hrs.	95 (67.4%)	46 (32.6%)	1.197(0.73-1.96)	0.475
≥10 hrs.	88 (63.3%)	51 (36.7%)		
Time spent engaged in activities not screen-based				
<180 minutes/day	74 (56.5%)	57 (43.5%)	0.48 (0.29-0.79)	0.003
≥180 minutes/day	109 (73.2%)	40 (26.8%)		

Request to use phone/any screen media device				
Yes	159 (71.9%)	62 (28.1%)	3.74 (2.06-6.79)	<0.001
No	24 (40.7%)	35 (59.3%)		

4.8.4 Screen Time association with Parental Behaviour and Attitudes

Table 13 presents results analysis of high screen time in relation to parental behaviour and attitudes. There was a significant association between a high parental screen time of more than 60 minutes per day and a child having a higher screen time of more than 1 hour/day, (OR 13.96[95% CI 6.88-28.33]; $p < 0.001$). A higher proportion of children with parents/guardians with a high screen time had a screen time of more than 1 hour/day (77.7%) as compared to those whose parent or guardian had lower screen time of less than 60 minutes per day (20.0%).

Parent/guardian use of screen devices together with their child was associated with a higher proportion of screen time of more than 1 hour/day in the child (69.9%) compared to those children who do not use any screen media device together with the parent/guardian (46.3%) This was also statistically significant (OR 2.70 [95% CI 1.47-4.94]; $p = 0.001$).

Children whose parents/guardians worried about their screen use had a high screen time use or more than 1 hour (74.1%) as compared to those whose parents/guardians did not worry about their screen use (48.4%). Parental worry about the child's screen use had a statistically significant association to screen time (OR 3.04 [95% 1.80-5.11]; $p < 0.001$).

Children whose parents/guardians have household rules regarding screen use had a higher proportion of screen time (68.9%) as compared to those with no household rules on screen use (57.5%) but the association was not statistically significant.

Table 14: Association of Screen Time with Parental Behaviour and attitudes

Variables	>1hr of Screen Time (n=183)	≤1hr of Screen Time (n=97)	OR (95%CI)	P-value
Parental Screen Time				
>60 minutes	171 (77.7%)	49 (22.3%)	13.96(6.88-28.33)	<0.001
≤60 minutes	12 (20.0%)	48 (80.0%)		
Use of screen devices together with child (co-viewing)				
Yes	158 (69.9%)	68 (30.1%)	2.70 (1.47-4.94)	0.001
No	25 (46.3%)	29 (53.7%)		
Household rules regarding screen use				
Yes	133 (68.9%)	60 (31.1%)	1.64 (0.97-2.77)	0.063
No	50 (57.5%)	37 (42.5%)		
Parental Worry about child's screen use				
Yes	137 (74.1%)	48 (25.9%)	3.04 (1.80-5.11)	<0.001
No	46 (48.4%)	49 (51.6%)		

4.9 Multivariate Analysis

Multivariate analysis was performed in order to determine the predictors of screen time among participating children. The factors associated with screen time at $p < 0.05$ during bivariate analysis were considered for multivariate analysis. Binary logistic regression was used. Age of 1st screen exposure, parental screen time and time spent on non-screen based activities were significantly associated with screen time.

Table 15: Logistic regression between screen time and associated factors

Factor	Odds ratio (95% CI)	P-value
Highest level of education None – None primary	3.58 (1.25 – 10.30)	0.018
Age at 1 st screen exposure <3yrs	0.28 (0.14 – 0.57)	<0.001
Total number of devices - >=4	1.79 (0.81 – 3.94)	0.148
Parent screen time - > 60minutes	0.10 (0.04 – 0.24)	<0.001
Eating meals while Using Screen devices - Yes	0.52 (0.26 – 1.05)	0.070
Non screen time - < 180 minutes	2.64 (1.39 – 5.01)	0.003
Use any of the screen devices together with child. - Yes	1.01 (0.44 -2.33)	0.977
Request by child to use the phone or any other screen media- Yes	0.78 (0.34 – 1.79)	0.564
Parental worry about the amount of time child spends on screen - Yes	0.55 (0.27 – 1.11)	0.093

CHAPTER 5: DISCUSSION

This study sought to describe the screen time use among preschool children and the associated factors. The study found that 65.4% of preschool children aged 3-5 years had screen time exposure of more than 1 hour per day that exceeded the WHO (1) and AAP (8) recommendations for this age group. These findings are similar to studies done in India and South Africa that showed >80% (45) and 67% (75) respectively of preschool children exceeded the screen time recommendations. It also compares to a study done in Kenya among preschoolers showed that 80.7% of them spent more than 2 hours per day watching TV(49), however, the study only focused on TV unlike this study which looked at screen time involving several screen devices.

In this study, children had a higher screen time on the weekends (3.25 hours/day) than on the weekday (3 hours/day). The percentage of children with >1hr of screen time was higher on weekend days (69.3%) than weekdays (57.9%). This compares to a study done in Czech Republic which showed significantly more screen time at weekends than on weekdays. (53) Another study done in Brazil showed that the percentage of children with ≥ 3 hrs of screen time was significantly higher on weekend days (36.9%) than weekdays (18.3%). (54)

Parental screen time was found to be significantly associated ($p < 0.001$) with the child's screen time in this study. This finding is consistent with previous studies done in other countries. A study done in Brazil showed that parental screen time was positively associated with children's screen time, either directly or indirectly through the effects of reduced self-efficacy to limit screen time (54). Another cross-sectional study from Canada found that parental screen time was a positive predictor of the child's screen time (14). This could be due to the fact that children mostly rely on the parents/guardians for access to screen devices.

Children from households with four or more screen devices in this study were more likely to have a higher screen time in comparison to those from households with less than four screen devices. This finding is similar to other studies that have shown having multiple devices in a home increased the likelihood of high screen time in children (45, 55, 59). A similar study done in India among preschool children showed that children from households with four devices had almost a three-fold increased odds of high screen time (45). It is possible that multiple gadgets provide for cumulatively higher screen time since different devices provide children with varying forms of engagement.

This study found that a majority (71.3%) of children started screen use before 3 years of age. A similar study done in India among preschoolers 2-6 years of age showed that 87.2% of the children started screen use by the age of 3. This compares to a study done in India that showed that half of the parents in that study had introduced screens to children by 2 years of age (45).

In this study, children who were engaged in more than 3 hours of other activities (73.2%) not involving screens (playing outdoors, reading/being read to and playing with toys) were more likely to have a high screen time than those children who engage in less than 3 hours (56.5%) of other activities not screen-based. These findings were comparable to a study from Netherlands which showed children who viewed TV more than 1.5 hours/day were found to play more outside and also participate more in organized sports than children viewing TV for a less duration (59). This may represent the fact that screen time is a replacement for outdoor activities in some cases.

Children who always or often (78.9%) had their meals while using screen devices were more likely to have higher screen time than those who never or rarely (58.9%) had their meals while using screen devices. This study showed a significant association between mealtime screen use and daily screen time ($p=0.001$). These findings are comparable to a study done in Lithuania which showed that screen use during meals in early childhood was associated with overall screen time and longer daily screen time was found to be a significant predictor of occasional use of screens during meals (76). Another study done in India showed that children who watch TV while eating had almost 80% greater odds of having high categories of screen time exposure (45). Both the American academy of Pediatrics (AAP) (8) and the Canadian Pediatric society (77) recommend avoiding screen use during meal times.

In this study, use of screen devices together with the child (Co-viewing) was associated with a higher screen time for the child as compared to those children who did not co-view screen devices with the parents/guardians. A study done in Texas, USA found that social co-viewing with parent was directly associated with greater child TV viewing and this is comparable to this study (78). On the contrary, another study from Kerala in India found that co-viewing was associated with use of screens only up to the recommended time of 1 hour per day in children 2-5 years of age (79).

Children whose parents/guardian had post primary education were more likely to have a higher screen time as compared to those children whose parents/guardian had primary or lower level of education. This may be a reflection of the higher access that comes with education and economic empowerment. This is in contrast to several studies that have shown low parental education is associated with increased use of screen time among children (14, 23, 47, 66). Other studies however, have found an indeterminate association between parental education and children's TV viewing (80, 81).

Our study also found that children who requested their parents/guardian to use any of the screen devices had a higher screen time than those children who did not make such requests. This compares to a study that was done in India which showed association of request to use phone by children was significantly positively associated with screen time use (45).

Parental worry about a child's screen use was found to have a significant association with screen time in this study. Children whose parents/guardians worried about their screen use had a higher likelihood of increased screen time of more than 1 hour than in those children whose parents/guardians had no worry on their screen use. A study done in six European countries found that most parents do not express worries about their children's TV viewing time (64).

CONCLUSION

A large proportion of preschool children aged 3 – 5 years are exceeding the recommended screen time guidelines by the WHO.

Screen time had a significant association with parental screen time, age of first screen exposure and time spent on none-screen based activities.

RECOMMENDATIONS

- There is need to raise awareness on the excessive use of screen time among preschool children and inspire focus on interventions to deal with this emerging public health problem.
- Educate health care workers as well as parents/guardians about screen time guidelines in this age group.

STUDY LIMITATIONS

The self-reporting of screen time for children by the parent can be subject to recall bias. However, questions were structured in a way to minimize the bias. Furthermore, use of parental report on TV viewing in children has been used widely in literature (14, 45, 46, 60) and has been shown not to manifest any systemic bias (82). The report of parent's has also been shown to correspond with the actual time of viewing (83).

An online filled questionnaire may also lead to selection bias. People not able to access the questionnaire online, either due to lack of internet/ phone or illiteracy, may be left out. This may influence who is likely to respond. Some people also choose not to respond to the questionnaire even though they have online access. This may limit generalizability of the study. To minimize the bias introduced, parents/guardians selected to participate in the study were sent reminders. Parents/guardians contacted to participate in the study were also given an option to answer the questionnaire through an online link or via telephone interview. Those not able to fill an online questionnaire were contacted for a telephone interview. The option of phone interview consent and interview was made available and made clear so that parents could choose right early (at the beginning of study). To cater for the non- response, more questionnaires links were distributed to be able to reach the required sample size. The questionnaire link was also done through both WhatsApp and email to increase access and limit selection bias.

The timing of the study coinciding with high rates of COVID -19 transmissions implies that some parents may have been required to work online from home which necessitates use of electronic gadgets. This is a major factor in how children would in turn use electronic screens either through being kept busy to allow parents to work or by taking advantage of the parental use of the electronic gadgets.

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APPENDIX 1: INFORMED CONSENT

Study Title: Screen time usage among preschool children aged 3-5 years in Nairobi County, Kenya.

The informed consent has two parts:

- Information sheet
- Consent form

PART 1: INFORMATION SHEET

Introduction: I am Dr. Christine Wanjiku Kangangi, a postgraduate student at the University of Nairobi Department of Pediatrics and Child health. I am conducting a study to find out the Screen time use among preschool in Nairobi County. This is as part of the requirements for the postgraduate degree in Master of medicine in Pediatrics and child health.

Screen time: It is the time spent passively watching screen-based entertainment (TV, computer, mobile devices).

Purpose of the study: The study will be conducted to find out the screen time use and associated factors among preschool children in Nairobi County.

Excessive screen exposure in early childhood has been associated with increased likelihood of sedentary behavior, obesity, poor sleeping habits and developmental abnormalities. This study will help us understand the screen time habits of preschool children in our setup which in turn will assist to educate health care workers as well as parents on how best we can manage screen time to prevent the associated harmful effects of screen time.

Study Procedure: A link to an online questionnaire will be sent to you as the parent/guardian. If you are not able to access an online questionnaire, a phone interview will be done. If you choose to participate in the study, fill in the questionnaire and submit. Participation in the study is voluntary and if you decline to participate, you will not be victimized in any way.

Benefits: There will be no direct benefits to the participant but data collected will help inform clinical practice and guideline formation.

Risks: There are no risks associated with participation of the study.

Confidentiality: The information recorded is confidential, your name or that of the child will not be included on the forms and only a number will be used to identify you. Only the principal investigator will have access to the research data and any publication will not be having any identifiers.

Contact information:

For any information regarding your rights as a study participant you can contact:

**The chairperson,
Kenyatta National Hospital/University of Nairobi Ethics and Research Committee
P.O Box 19676 -00202, Nairobi, Kenya
Tel: (254- 020) 2726300-9 Ext 44355
Email: uonknh_erc@uonbi.ac.ke**

For any clarification or questions regarding this study contact the principle investigator:

**Dr. Christine Wanjiku Kangangi,
Mobile no: 0723819961
Email: cwkangangi@yahoo.com**

PART II: Consent Form

1. I confirm that I have read and have understood the information sheet for the above study. I have had a chance to ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any given time without giving any reason.
3. I understand that I can at any time ask for access to the information I provide and can request for the destruction of that information if I do so wish.
4. I accept that my child take part in the study

Participant's signature

Date

APPENDIX 2: QUESTIONNAIRE

Questionnaire No:

Child initials.....

School Region.....

School fees (per term).....

STUDY TITLE:SCREEN TIME USAGE AMONG PRESCHOOL CHILDREN AGED 3-5 YEARS IN NAIROBI COUNTY, KENYA.

PART I: SOCIODEMOGRAPHIC

1) Age of the child(Years)

.....

2) Gender of the child

Male

Female

3) Parent/guardian filling in the questionnaire

Mother

Father

Guardian (mention relationship with the child).....

4) What is the highest level of education attained by parent/guardian?

None

Primary

Secondary

Tertiary/college

University

5) What type of school does your child attend?

Private

Public

6) How much school fees does your child pay per term (in Kenyan shillings)?

.....

7) Does your child have any siblings?

- Yes No

8) How many rooms are used for sleeping in your household?

- One
 Two
 Three or more

9) How many people usually live in your house hold?

.....

10) What is the family structure?

- Two parent/guardian

 Single parent/guardian

11) What is the monthly Household income?

- Less than 10000
 10001-20000
 20001-30000
 30001-40000
 40001-50000
 More than 50000.

PART II: PHYSICAL ENVIROMENT

12) Which of the following devices are available at your home?

- a) Television
 Yes, If yes, how many do you have.....
 No
- b) Computer (including Laptop)
 Yes, If yes, how many do you have.....
 No
- c) Mobile Phone
 Yes, If yes, how many do you have.....

- No
- d) Video game system (Xbox, PlayStation)
 - Yes, If yes, how many do you have.....
 - No
- e) Tablet
 - Yes, If yes, how many do you have.....
 - No
- f) Other (please specify).....

13) Do you have any of the following devices in the same room where your child sleeps?

- a) Television Yes No
- b) Computer (including Laptop) Yes No
- c) Mobile Phone Yes No
- d) Video game system (e.g. play station) Yes No
- e) Tablet Yes No
- f) Other (please specify).....

PART III: SCREEN TIME

14) At what age did your child start watching television or playing video/computer games?

.....

15) Over the past month, on average, about how much time per day did your child usually spend engaged in the following screen-based activities?

Put one cross mark in each line - both for a typical weekday and weekend day (mins = minutes, hrs = hours)

Weekday: Monday morning to Friday Evening.

Weekend: Saturday Morning –Sunday Evening

		Weekday (time per day)								Weekend days (time per day)							
		None	1-29 mins	30-59 mins	1-2 hrs	2-3 hrs	3-4 hrs	4-5 hrs	5 hrs or more	None	1-29 mins	30-59 mins	1-2 hrs	2-3 hrs	3-4 hrs	4-5 hrs	5 hrs or more
a) Watching	TV/Video	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Weekday (time per day)									Weekend days (time per day)								
	None	1-29 mins	30-59 mins	1-2 hrs	2-3 hrs	3-4 hrs	4-5 hrs	5 hrs or more	or	None	1-29 mins	30-59 mins	1-2 hrs	2-3 hrs	3-4 hrs	4-5 hrs	5 hrs or more	
shows/DVDs																		
b) Using Mobile phone(watching videos/playing games/using internet)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Using computer/Tablet (playing games/using internet)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Playing Video games (play station,Xbox, Wii)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) School-related tasks using screen media devices (online classes/homework)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you selected **other**, please provide examples of what this includes:

16) Over the past month, on average, about how much time per day did you usually spend engaged in the following screen-based activities?

Put one cross mark in each line - both for a typical weekday and weekend day (mins = minutes, hrs = hours)

Weekday: Monday morning to Friday Evening.

Weekend: Saturday Morning –Sunday Evening

Weekday (time per day)	Weekend days (time per day)
------------------------	-----------------------------

	None	1-29 mins	30-59 mins	1-2 hrs	2-3 hrs	3-4 hrs	4-5 hrs	5 hrs or more	None	1-29 mins	30-59 mins	1-2 hrs	2-3 hrs	3-4 hrs	4-5 hrs	5 hrs or more
a) Watching TV/Video shows/DVDs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Using Mobile phone(watching videos/playing games/using internet)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Using computer/Tablet (playing games/using internet)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Playing Video games (play station,Xbox, Wii)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Social media or other types of communication (e.g. Facebook, Messenger, Twitter, Whatsapp, Snapchat, Instagram, private Email, SMS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Work-related tasks using screen media devices (online meetings/webinars/internet/writing reports)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you selected **other**, please provide examples of what this includes:

PART IV: FACTORS ASSOCIATED WITH SCREEN TIME

17) On average, how many hours per day does your child spend on the following activities?

Weekday (time per day)

Weekend days (time per day)

	None	1-29 mins	30-59 mins	1-2 hrs	2-3 hrs	3-4 hrs	4-5 hrs	5 hrs or more	None	1-29 mins	30-59 mins	1-2 hrs	2-3 hrs	3-4 hrs	4-5 hrs	5 hrs or more
a) Playing outdoors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Reading/Being read to a book (not electronic)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Play using traditional toys/activities e.g. dolls, toy car	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Playing with other siblings and/or friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you selected **other**, please provide examples of what this includes:

18) How often does your child have his meals while watching TV/videos, playing videogames or using a computer or mobile device?

Never

Rarely

Sometimes

Often

Always

19) What time does your child usually go to bed on a typical weekday?

.....

20) What time does your child usually wake up on a typical weekday?

.....

21) a) Do you normally use any of the screen devices together with your children?

Yes

No

b) If yes, which of the following devices do you most commonly use together with your child? (Pick one only)

- a) Television
- b) Computer (including Laptop)
- c) Mobile phone
- d) Video game system
- e) Tablet
- f) Other (please specify).....

22) Does your child usually request to use your phone or any other screen media device?

- Yes
- No

23) Do you have any rules in the house regarding use of screen devices?

- Yes
- No

24) Do you worry about the amount of time your child spends on screen devices?

- Yes
- No

25) The reason I usually give my phone or any of the other screen devices is:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
a) Calm down the child					
b) To be able to do house chores					
c) As a form of entertainment to the child					
d) For education purposes					
e) Other (specify)					

Thank you.

APPENDIX 3: ETHICAL APPROVAL LETTER



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

Ref: KNH-ERC/A/457

Dr. Christine Wanjiku Kangangi
Reg. No.H58/12269/2018
Dept.of Paediatrics and Child Health
School of Medicine
College of Health Sciences
University of Nairobi

Dear Dr. Kangangi

RESEARCH PROPOSAL – SCREEN TIME USAGE AMONG PRESCHOOL CHILDREN AGED 3-5 YEARS IN NAIROBI COUNTY, KENYA (P187/03/2020)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 16th December 2020 – 15th December 2021.

This approval is subject to compliance with the following requirements:

- a. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- b. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
- c. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
- d. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
- e. Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
- f. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- g. Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

Protect to discover



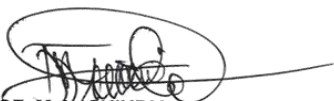
KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

16th December 2020



For more details consult the KNH- UoN ERC website <http://www.erc.uonbi.ac.ke>

Yours sincerely,



PROF. M. L. CHINDIA
SECRETARY, KNH-UoN ERC

- c.c. The Principal, College of Health Sciences, UoN
The Senior Director, CS, KNH
The Chairperson, KNH- UoN ERC
The Assistant Director, Health Information Dept, KNH
The Dean, School of Medicine, UoN
The Chair, Dept. of Paediatrics and Child Health, UoN
Supervisors; Prof. Dalton Wamalwa, Dept. of Paediatrics and Child Health, UoN
Dr. Anjumanara Omar, Dept. of Paediatrics and Child Health, UoN

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APPENDIX 4: NAIROBI COUNTY RESEARCH AUTHORIZATION LETTER

NAIROBI CITY COUNTY

Telegraphic Address
Email: info@nairoti.go.ke
Web: nairobi.go.ke



CITY HALL ANNEXE:
P.O. BOX 30298 GPO – 00100.
NAIROBI, KENYA

EDUCATION, SOCIAL SERVICES AND GENDER

Our Ref: GL/NC/141 VOL. VI/346

12th February, 2021

Dr. Christine Wanjiku Kangangi
University of Nairobi
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application to carry out Research and Subsequent approval by National Commission for Science, Technology and Innovation vide letter Ref: NACOSTI/P/21/8486 dated 20th January, 2021;

I am pleased to inform you that authority has been granted to you to carry out research on *"Screen time usage among preschool children aged 3-5 years in Nairobi County, Kenya for the period ending 20th January, 2022.*

On conclusion of the study, you are expected to submit a copy of the research findings to the undersigned:


A handwritten signature in blue ink, appearing to read 'Raphael K. Kinyungu'.

RAPHAEL K. KINYUNGU
AG. DEPUTY DIRECTOR EDUCATION, PLANNING, PROJECTS AND PARTNERSHIP


Copy to: Chief Officer – Education, Social Services & Gender
Director City Education

"The City of Choice to Invest, Work and Live in"

APPENDIX 5: NACOSTI RESEARCH PERMIT


REPUBLIC OF KENYA

**NAIROBI CITY COUNTY
RECEIVED**
12 FEB 2021
EDUCATION DEPARTMENT
DISPATCH UNIT
TIME:
P. O. Box 30298 - 00100 NAIROBI


NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 372875

Date of Issue: 20/January/2021

RESEARCH LICENSE




This is to Certify that Dr.. Christine Wanjiku Kangangi of University of Nairobi, has been licensed to conduct research in Nairobi on the topic: Screen time usage among preschool children aged 3-5 years in Nairobi county, Kenya for the period ending : 20/January/2022.

License No: NACOSTI/P/21/8486

372875
Applicant Identification Number


Director General
NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY &
INNOVATION

Verification QR Code



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