UNIVERSITY OF CAPE COAST

KNOWLEDGE AND PRACTICES OF INFECTION PREVENTION AMONG TEACHERS IN EARLY CHILDHOOD EDUCATION CENTRES IN THE SUHUM MUNICIPALITY

SABINA OFFE

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BY

SABINA OFFE

Thesis submitted to the School of Nursing And Midwifery of the College of Health and Allied Sciences, University of Cape Coast, in partial fulfilment of the requirements for the award of Master of Nursing degree

JULY 2016

DECLARATION

Candidate's Declaration

I declare that the thesis work "Knowledge and Practices of infection prevention among Teachers in Early Childhood education centres in the Suhum Municipality" Is my own work; moreover, this thesis has not been presented for award of degree in any other university.

Candidates' Signature: ……..……. Date: ……..……

Name: Sabina Offe (Student Number - BS/MNS/14/0008)

Supervisor's Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines of the thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature : ……. Date: ……

Name: Dr Mate Siakwa

Co- Supervisor's Signature: ……..……. Date: ……

Name: Dr Samuel Victor Nuvor

ABSTRACT

Teachers in early childhood education centres are the epitome of care concerning infection prevention for young children in educational programmes. A comparative descriptive quantitative survey was used to assess the knowledge level, practice and resources availability for infection prevention in early childhood education centres in the Suhum Municipality. One hundred and sixty (160) teachers from 52 randomly selected early childhood centres; cretches, nurseries, day cares and kindergartens were \recruited for the study. The findings of the study revealed that both public and private school teachers in early childhood education centres have a good knowledge about infection prevention measures and control. Knowledge level on infection prevention is comparable between the two categories of teachers. However, this did not translate into practice. It was observed that most of the learning centres visited were overcrowded (exceeded GES recommended 28 children per a teacher ratio). There were also inadequate and inappropriate sanitary facilities in the studied early childhood education centres. Notwithstanding lack of resources, private schools had more resource than the public schools (p=0.001). It is recommended caregivers in childhood education centres receive adequate training on infection prevention before and during employment. The Ministry of Education and Ghana Health Service must ensure there are adequate sanitary facilities before approval is given for the running of the programme and regular monitoring to ensure their sustainability.

KEYWORDS

Diapering technique

Disinfection

Early childhood education centres.

Hand hygiene

Infection prevention

Microorganism

Private school teachers

Public school teachers

Sanitation

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DEDICATION

I dedicate this thesis to my husband Mr Richard Antwire, my three lovely daughters; Nana Abena Annorbea Antwire, Maame Akua Agyapomah Antwire and Adwoa Nyarkoa Antwire.

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ABBREVIATIONS AND ACRONYM

AAP	American Academy of Paediatrics
ARPHS	Auckland Regional Public Health Service
CDC	Centers For Disease Control
CMV	Cytomegalovirus
DCE	District Chief Executive
DCS	Disease Control Services
EHEC	Enterohemorragic Escherichia Coli
ECDC	European Centre For Disease Prevention And Control
ECCE	Early Childhood Care and Education
GHS	Ghana Education Service
HH	Hand Hygiene
HPA	Health Protection Agency
HPS	Heath Protection Surveillance
HINARI	Health Internetwork Access to Research Initiative
HINI	Human Influenza Subtype A
HWWS	Hand Washing With Soap
MMR	Measles, Mumps, And Rubella
NHMRC	National Health And Medical Research Council
PEHA	Pre-Employment Health Assessment
SHEP	School Health Education Programme
UNICEF	United Nations International Children Emergency Fund
WASH	Water, Sanitation And Hygiene
WHO	World Health Organisation
NHS	National Services Scotland

CHAPTER ONE

INTRODUCTION

Background to the Study

Infection prevention at early childhood education centres refers to policies and procedures employed to reduce the transmission of microorganisms among children and the staff in the schools. Such measures include following national immunization guidelines in immunising both children and teachers. Other key areas of concern include the implementation of general hygienic measures such as appropriate hand washing procedures, environmental sanitation, management of bodily fluids and respiratory etiquette. Infection prevention at childhood learning centres remains a global public health issue. This is evident in the kinds of policies and guidelines developed and adapted from international organizations such as United Nations International Children Emergency Fund (UNICEF), American Academy of Paediatrics (AAP), World Health Organisation (WHO) and Centers for Disease Control (CDC).

On the other hand, local policies and standards concerning infection prevention that are set for childcare operators and teachers in early childhood education centres remain inadequate to safeguard the health and welfare of children who attend these education centres. It could be argued that are neither teachers health care professionals nor do they have intensive training in standard infection control precautions. However, since childhood, learning centres are public institutions with vulnerable children, basic knowledge and practices on infection prevention applied by these teachers would reduce disease transmission among children as well as the teachers to a degree.

Health protection surveillance (2012) is of the view that teachers in early education centres should be managed from an occupational health viewpoint, in the same manner as healthcare staff. Once they are exposed to infectious bodily fluids such as blood, vomitus, faeces, urine and nasal secretion, they are committed to provide a safe and healthy working environment for the entire staff. The American Academy of Paediatrics (2012) also states, that teachers are operating under a policy of nondisclosure of infection with blood-borne pathogens among children. As previously recommended by the AAP, HIV-infected children should be admitted without restriction to childcare centres and schools and that they should be allowed to participate in all activities to the extent that their health and other recommendations for management of contagious diseases permit. Therefore, all persons responsible for the care of children need to understand appropriate infection prevention and control practices to protect immuno compromised children, as well as caregivers and lay mates, from acquiring transmissible infections.

Statement of the Problem

Several infections have been linked to early childhood education centres. According to Nesti and Goldbaum (2007), establishments of early childhood centres are known to be environments with special epidemiological characteristics for disease transmission since such centres have populations with characteristic profiles and with specific risks for the transmission of infectious diseases. Sonoda et al. (2007), using stool laboratory investigations, found enterohemorragic *Escherichia coli* (EHEC) in 229 nursery school children, 49 nursery school staff and 78 family members of the patients after a follow up was made on a 7-year girl who had an infected diarrhoea stool with

EHEC. Subsequent follow-ups indicated her 4-year old sister who attended a nursery school was also infected together with five children who presented diarrhoea at the same nursery school. Similarly, Raffaelli et al. (2007) investigated an outbreak of *E.coli* 0157: H 7 in diarrhoea stool in an urban childcare centre of which 11 out of 45 participants tested positive and two out of the 11 had progressed to haemolytic uremic syndrome. In the same way, Younus et al. (2010), in their case-control study, also suggested that a *Salmonella infection*, which is one of the causes of gastrointestinal diseases in children under the age of five, was associated with attendance at a day care centre. Otitis media has also been found to be one of the common infections in early childhood education centres. Bluestone and Klein (2007) defines Otitis Media as inflammation of the middle ear without reference to pathology may have adverse effects on a child with reduced performance at reading comprehension and or compromised cognitive ability which can further result in compromised educational performance due to inability to hear in class (partial loss or temporal loss in hearing).

In Ghana, though early childhood education centres have not been in existence for long, there has been an increase in the establishment of the centres as a result of mandatory requirement of educational reform in Ghana (2007) to set up early childhood education centre in every public school. There is also an increasing private childhood education centres because of the changing maternal role in society. As enumerated earlier, the establishment of early childhood education centres comes with its associated infections, which could be compounded by the prevailing sanitation problems in Ghana with diarrhoea diseases as a consequence, In addition, there is paucity of literature

on infection prevention practices in early childhood education centres in Ghana. There is therefore the need to assess the situation in the childhood learning centres concerning the knowledge level, practice of caregivers, availability of resources and barriers to infection practices in the early childhood educations centres and make recommendations for the betterment of the programme. The Suhum Municipality is known to be one of the districts with the highest number of early childhood education centres approximately 115 (Suhum Municipal Education Office, 2015) both in public and private lives in the country and could be a good model for the problem of the study.

Purpose of the Study

The study aimed at assessing the knowledge level and infection prevention practices among teachers within early childhood education centres in the Suhum Municipality.

Specific Objectives of the Study

The objectives of the study are to:

1. Assess the knowledge level of teachers on infection prevention in early childhood education centres.
2. Determine infection prevention practices among teachers in the early childhood education centres.
3. Identify resource availability for infection prevention in the early childhood education centres.
4. Identify barriers to the practices of infection prevention and control in early childhood education centres.

5. Compare the knowledge level and practices of infection prevention measures among teachers in public and private early child education centres in the Suhum Municipality.
6. Determine the impact of demographic features of teachers in early childhood education centres on knowledge level and the practice of infection prevention.

Research Questions

The following questions guided the study:

1. What is the knowledge level of teachers on infection prevention in early childhood education centres?
2. What are the infection prevention practices among teachers in early childhood education centres in the Suhum Municipality?
3. What are the resources available in early childhood education centres in the Suhum Municipality concerning infection prevention and control measures?
4. What barriers exist in early childhood education centres that prevent the practice of infection prevention by teachers in the Suhum Municipality?
5. How does the knowledge level and practice of infection prevention among teachers of private differ from public early childhood education centres in the Suhum Municipality?
6. What is the impact of demographic features of teachers in early childhood centres on knowledge and the practice of infection prevention?

Significance of the Study

The study being a descriptive one has an important role in nursing research. The study is designed to promote health in early childhood education settings. In other words, it will encourage providers of early childhood education centers to accept the responsibility for preventing the spread of diseases in their childcare setting as well as assist in establishing, developing, and promoting written policies based on best available evidence and consensus recommendation, regarding health and safety in their early childhood educations settings. In addition, childcare providers will appreciate how to protect themselves against exposure to infectious diseases including respiratory conditions such as tuberculosis and blood born infections like CMV, Hepatitis A, and C through an accurate practice of standard precautions as promulgated by international standards such as World Health Organisation guidelines. Furthermore, the outcome of the study is to broaden the scope of work of school nurses as well as public health nurses in order to guide the activities of childcare operators concerning infection prevention. Once infection is prevented and controlled in childhood education centres, there will be improvement in the quality of life of families because health care costs and lost work to families will be minimized resulting in increased parental productivity in the society.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The primary searches were conducted on several academic databases, including Google scholar, HINARI and sage publications, using a varied range of terms intended to explore the number of potentially full text peer reviewed and appropriate articles concerning infection prevention in early childhood education centers. Journal used in the review were those published between 2005 and 2015 those that focused on the effects of access to safe water, hand-washing facilities, diapering and environmental cleaning. Studies also included those that were documented in English-language. In addition, a number of websites such as those for the Centers of Disease Control and WHO were used in reviewing data. Data on local policies from the Ghana Education Service (GHS) and Municipal Office of Suhum concerning infection prevention in the schools were reviewed. Finally, studies that focused on the implications of inappropriate use of infection prevention practices on the child, the entire school, and the community were reviewed.

Early childhood Education Centres in Ghana

The increase in the number of private schools in Ghana was partly due to the crumbling nature of public schools in the country that brought about an urgent need for the government to find an alternative form of education for Ghanaian children. Private individuals who wanted to do business established most of the kindergarten schools in addition to some NGOs. These resulted in schools sited in urban communities where enrolment was high and so majority of poor and rural communities did not benefit from their services (Ayebah,

2009). In addition, the increase demand for female labour market had encouraged private set up of early childhood centers, which are crèches, day cares, nurseries, and kindergartens to take care of children as young as six weeks. During that period, there seemed to be no standard curricula or activities, neither was there any guideline from the Ministry of Education on early childhood education in Ghana. According to the Ghana Education Service Report (2014), in the 2003/2004 year, basic education underwent drastic reforms to include the basic compulsory education system. Consequently, education for children aged 4-6 years became an integral part of the formal educational system in Ghana, following recommendations from the President's Committee on Review of Education Reforms about the importance of early childhood development. Early Childhood Education therefore has become an integral part of our basic education for teaching pre-school children (Donkor, 2011) and has been made compulsory for pupils before they proceeded to school. In 2007, a government policy mandated every primary school to have a kindergarten class attached to it (Ghana Ministry of Education Report, 2010), thereby making the public childhood centres more than the private ones. Since 2003, there has been a significant increase of 7.6 % in public kindergartens as well as private kindergartens annually (MOE Report, 2010).

Early childhood education teaches very important skills like hand washing to prevent diseases, teeth brushing after meals to prevent tooth decay, developing cavities, and cleanliness in general to promote healthy life which is done in an interactive way through storytelling, reading books videos and drama put together by the kids with their teachers' guidance (Donkor, 2011).

Early Childhood Educational Teachers

The paucity of men in teaching is certainly not a new phenomenon and has remained relatively constant despite a century or more of various educational reforms (Johnson, 2008). Anliaka and Beyazkurk (2008) are also of the view that while, in some professions, the gender balance seems to be changing in the direction of equality, the participation of males in early childhood education has not expanded. Johnson (2008) reported that current statistics on the lack of male teachers, establish the necessary historical context of the issue that teaching as classification as 'women's work' is adequately understood. The literature on the lack of male teachers cites several common reasons for the gender disparity in the teacher workforce. Teaching's association with care, nurturance, and domesticity firmly places the profession outside the normative boundaries of what are acceptable masculine practices where male teachers are seen 'soft'. Moreover, while on the job, men experience undue pressures to avoid physical contact or to be alone with young children for fear of a perceived impropriety. Evidence from the research also suggests fear of being accused of sexual abuse as a factor. Hence, many men are reluctant to work with children (Anliaka & Beyazkurk, 2008).

Qualified teachers have a significant impact on the quality of learning and teaching as Kane (2005) observes. Although the level of benchmark qualifications and proportion of qualified staff in early childhood centres varies from country to country (Dalli et al., 2010), Tarr (2006) states that the notion of what a teacher knows (knowledge), shows (attitudes) and does (skills) have an impact on the learners they work with. Sammons (2010) also indicated that well-resourced early childhood services with higher numbers of

qualified teachers provide the highest quality of education and care, and the children attending these childhood centres make better progress. Research tells us that well-educated early childhood teachers and directors are imperative to providing our youngest learners with the tools they need for success in school and life. Presently, in the Suhum Municipality, most qualified teachers who teach in the early childhood centres have class 'A' Certificate in teaching with a few untrained teachers in the system. However, the Ghana Education Service mandatorily requires teachers to upgrade themselves to diploma in childhood education before 2020. The current curriculum for early childhood education at the University of Cape Coast incorporates hygienic measures such as hand washing and environmental cleaning. Consequently, it is expected that teachers who have gone through the course and those yet to enrol will have knowledge on basic infection prevention measures.

Studies have also shown that appropriate classroom group sizes contribute to early childhood education program quality. Teacher Education, staff/child ratio, and group sizes are the three indicators of quality of childhood education. DeSchipper et al. (2006) identified that the strongest and most consistent predictor of observed positive care giving in group-based early childhood settings as the adult: child ratio. That is, caregivers provided more sensitive, frequent and positive care when they were responsible for fewer children. The study found that child ratios in settings for children between (0- 5) years can be found in numerous advisory documents prepared for policy makers in different jurisdictions. After substantial literature reviews from the Australian Expert Advisory Panel on Quality Early Childhood Education and

Child Care (2009), the American Association of Paediatrics (2011), American Academy of Paediatrics and the American Public Health Association, recommend an appropriate staff/child ratio and group size. Age maximum Child to staff ratio indicates that every age group has a number of maximum group that should be contained in a classroom. It is recommended that children less than 12 months should have maximum class size of six children with two teachers. Those less than 3 years are to have a group size of 8 with two teachers, those with a maximum of 14 students with two teachers, and those children with 16 children as the maximum in a class or 20 children as a maximum should have two teachers. The increased interaction and communication possible in smaller classes have been shown to affect children's outcomes. The National Association for the Education of Young Children (2008) states that smaller group sizes and larger ratios of staff to children are related to positive outcomes for children. New Zealanders Bedford and Sutherland (2008) have drawn attention to the need to consider the effect that element of the physical environment of early childhood settings, as crowded settings can have on the health of infants and toddlers, such as ear infections and other childhood illnesses. Similarly, AAP (2014) indicated that larger size of center, larger group size, and fewer staff members caring for more children have all been linked to increased incidence of infectious diseases. According to National Institute of Child Health And Human Development (2006), children in large group care are more likely to have an ear infection and a stomach illness than children in small group settings. In addition, children in large group care were more likely to have an upper respiratory illness than in small group settings. This is because larger groups

(group size) consist of more potential "infectious agents. The study further found out that the children in more hours of childcare each week during their first year of life were 8 percent more likely to have an ear infection. Again, children in more hours of care each week during their first year of life were 4 per cent more likely to have stomach flu. Atopic eczema neurodermatitis has been dormant before attending day care. However, day care attendance and quality could either awake or prolong atopic eczema. Children who suffer from atopic eczema might require more attention that might be difficult to provide in large groups. In addition, less educated teachers might be less responsive to extra care. The Ghana National Policy on Child to Adult Teacher Ratio recommends all child educational centres to have 28 children to a teacher for the public schools and 25 children to a teacher for the private schools. Information from the District Municipality of Suhum shows that despite the municipal regulations, a classroom of childhood centres caters for as much as 50 children owing to the fact that, the total population and particular distance of community account for the number of schools in that vicinity.

Common Infections and Its Impact in Early Childhood Education Centres

Several infections have been linked to early child centres. Sonoda et al (2007) through stool laboratory investigations found enterohemorragic *Escherichia coli* (EHEC) in 229 nursery school children 49 nursery school staff and 78 family members of the patients after a follow up was made on a 7 year girl who had infected diarrhoea stool with EHEC. Subsequent follow up indicated her 4-year sister who attended a nursery school was infected in

addition to five children who presented diarrhoea at the same nursery school. Similarly Raffaelli et al. (2007) presented an outbreak of E.coli 0157: H 7 in diarrhoea stool in an urban childcare centre of which 11 out of 45 participants tested positive and two out of the 11 had progressed to haemolytic uremic syndrome.

Younus et al. (2010) in their case-control study, also suggested that *Salmonella infections* in children under the age of five were associated with attendance at a day care centre. Salmonella and EHEC are one of the causes of gastrointestinal diseases in children. According to ECDC (2013), gastrointestinal diseases can significantly cause school absenteeism in both students and teachers with a disruptive impact on school activities that affects both pupils and teachers. In addition, an outbreak in infectious gastrointestinal disease can lead to school closures that can cause major disruptions for all members of the school community.

Otitis Media has also been found to be one of the common infections in early childhood education centres that are often a complication from upper respiratory tract infection (Revai, Dobbs, Nair, Patel, Grady & Chonmaitree, 2007). Ramakrishnan and colleagues (2007) also caution that day care attendance as a risk factor for acute Otitis Media to occur as result of contact with multiple children and nature of day care providers facilitates. Bluestone and Klein (2007) define *Otitis Media* as inflammation of the middle ear without reference to pathology. Sequele and hearing lost are the most common complication in children, leading to unwarranted antibiotic consumption leading to microbial resistance in children in most countries and to an extensive burden of deafness and suppurative complications in developing

countries. In addition, children with chronic middle ear effusion score lower marks on tests of speech, language, and cognitive abilities. This indicates that even when treated correctly, Otitis Media may have adverse effects on a child with reduced performance at reading comprehension and or compromised cognitive ability can further result in compromised educational performance due to inability to hear in class (partial loss or temporal loss in hearing). Other burden of illness in children itself cause economic losses from considerable physician visits, medications, hospitalizations, and parents' loss of productivity related to caring for ill children at home. (Lee & Greig, 2010).

Other parasitic infectious diseases such as ringworm infestation as well as tenea and pediculosis are also common in day care centres. El-Dawelaa and colleagues (2012) used random sampling method in a cross-sectional study of three preschools and primary schools, from an urban, rural, and a slum area. One thousand, eight hundred and four (1804) children aged between 4–12 years were examined. Skin disorders were observed in 748 children, yielding an overall prevalence of 41.5%, and 1056 (58.5%) were clinically free from the disease. Pediculosis capitis, pityriasis alba, papular urticaria, and chicken pox were the most commonly observed, accounting for 67.4% of the disorders. Infectious skin diseases represented 59.1% of the skin disorders in their study. The results of the study was consistent with studies done in Iraq, Turkey, Ethiopia Tanzania and Ghana, where the prevalence rate of infectious diseases among school children were 59.1% in the present study, 8.8%,16.2%, varying rates between 50 and 60% in Ethiopia and Ghana respectively.

Staff looking after children themselves may be exposed to greater risk of infection (HPA, 2006). For instance, Cytomegalovirus (CMV) and

Parvovirus B19 infection found in day care centres with their grave consequences on female pregnant educators and their unborn babies is of great concern as studied by Stelma, Smismans, Goossens, Bruggeman, & Hoebe (2009). The main finding of this study was that female day care personnel have an increased risk of attracting a primary infection with CVM. An age dependent increase in CMV, IgG seropositivity was observed for both day care workers of women younger than 19 years, 12.5% (1 out of 8) and 22% (23 out of 104) respectively were positive for CMV IgG. Fifty Percent (40 out of 80) and 31% (16 out of 52; p=0.03) of women aged between 21 and 24 years and 53% (31 out of 58) and 50% (1 out of 2) of women aged between 25 and 29 years presented as CMV IgG-seropositive, respectively. The effect of cytomegalous infection on an unborn baby could be birth disabilities; such as irreversible central nervous system involvement including microcephaly, encephalitis, seizures, deafness, upper motor neuron disease and mental retardation with 10–17% of the infants that are asymptomatic at birth develop sensorineural hearing loss or neuro developmental sequelae months to years afterwards (Griffiths & Walter, 2005). Whereas transplacental transmission rates of Parvovirus have been estimated to be between 25 and 33%. Fetal infection with Parvovirus may lead to severe anaemia, generalised oedema, congestive heart failure and myocarditis, leading to fetal death in 5–9% of the cases, with the greatest risk in the second trimester of pregnancy. Cytomegalovirus infection is mediated through contact with infant saliva and urine, exposure mainly associated with caring for young infants during diapering procedures.

Knowledge Level of Infection Prevention among Teachers in Early Childhood Education Centres

Kindergarten teachers have the greatest influence on a child's habits because the child spends a lot of time with them; secondly, they manage the child's physical environment (Kim & Yu, 2014). There is increasing recognition that preschool teachers and childcare workers convey their health knowledge through modelling, nurturing and caring in their daily encounters with young children (Hearn, Miller and Campbell- Pope, 2008). Teachers also play the role of a model therefore appropriate hygiene behaviour; skills supervision of children and proper hygienic way is necessary (European Centre for Disease Prevention and Control, 2013). An increase in knowledge does not always lead to a change in the behaviour, but there is a positive association between knowledge and changing behaviour. .

Rooshenas et al. (2014) in their study proposed that Preschool-aged children are the highest consumers of antibiotics, but consult mainly for viral infections. This is because little is known about how day care providers manage infections, and the consequences this can have for parents' consulting and treatment-seeking behaviours. The study further found that day care providers have poor knowledge of when children are likely to benefit from antibiotic treatment, and often inappropriately encourage parents to seek antibiotic treatment through their routine practices and non-evidence-based exclusion policies. This can have opportunistic and financial cost implications for health services, and practical or financial disadvantages for working parents. Hence, improved day care provider knowledge of antibiotic indications could relieve one source of pressure to consult general practice and

obtain antibiotics for preschool-aged children. The findings of this study also have public health implications, given reports of community-wide outbreaks of antibiotic-resistant infections stemming from nurseries.

Causes and Sources of Infections in Early Childhood Education Centres

Microorganisms, including bacteria, fungi, viruses, and protozoa are the cause of infection, of which the human body may act as a reservoir. In the nursery, the main sources of microorganisms are from people, food and water. Viruses multiply within the body, but bacteria and fungi can multiply anywhere there is warmth and moisture` and build up rapidly where water and waste residues accumulate such as sinks, toilets and wet cleaning cloths (Infection Prevention Society, 2012). The organism can also survive in the air, on the surface of the skin, in body fluids and on objects such as toys and door handles that in other words serve as a source of infection in the schools. In addition, a person with an infection may or may not show any signs of illness may be infectious before they become unwell, during their illness or after they have recovered. For example, in cases of gastroenteritis, children, educators and other staff who no longer have diarrhoea (loose stools) may still shed diarrhoea-causing microorganism in their faeces for some time. This means that they are still a potential source of the disease-causing organism (National Health and Medical Research Council, 2012).

Disease Transmission in Early Childhood Education Centres.

Kotch et al (2007) supported by Cosby et al. (2008) in their study indicated that hand to mouth events, sharing toys, eliminating nasal secretions and changing diapers have been confirmed as the most common habits that might help microbial dissemination, especially when inadequate hand-washing

occurs. Similarly, Reynolds et al. (2005) found out that direct contact with contaminated surfaces is considered the principal mean of paediatric infectious transmission and surfaces from children's playground equipment in addition to day care centers were the most frequently contaminated compared with other public surfaces. Illnesses may be spread in a variety of ways, such as by coughing, sneezing, direct skin-to-skin contact, or touching a contaminated object or surface. Respiratory tract secretions that can contain viruses (including respiratory syncytial virus, rhinovirus and norovirus) contaminate environmental surfaces and may present an opportunity for infection by contact as Grenier and Leduc (2008) observed.

Concepts of Infection Prevention in Childhood Education Centres

For the purposes of infectious diseases control and prevention in child-care facilities and reducing associated cost, education and evaluation of the knowledge of teachers on disease transmission, hand washing, cleaning and disinfection techniques in early childhood education centers is recommended (Chen, 2013). An effective infection control and prevention program for an Early Child Education program has multiple components (Shope, 2014). Effective hand hygiene, exclusion of ill children as well as staff, immunization, cough and sneeze etiquette, appropriate use of gloves, effective environmental cleaning and staff education as the concept of infection control in early childhood education centres. In other words, these are measures used by teachers to control and prevent infections in the child centres. The concept of control and prevention strategies have been developed in accordance with several paediatric societies organisation and policy makers

such as Australian National Health And Research Council, American Academy Paediatrics and European Centre for Disease Control.

Effective Hand hygiene

The purpose of routine hand washing is to remove dirt and organic material as well as microbial contamination acquired by contact in the environment. While water is often called a "universal solvent," it cannot directly remove hydrophobic substances such as fats and oils, which often present on soiled hands. Appropriate hand washing therefore involves the use of soaps or detergents to dissolve fatty materials and facilitate their subsequent flushing with water. Thus, water alone is not suitable for cleaning soiled hands; soap or detergent must be applied as well as water (WHO, 2009). According to Centers for Disease Control (2011), hand washing is a central plank in the prevention of infectious disease and is second only to immunization as an essential component of infection control and prevention. WHO's Report (2013) states that, "there still remains much to be done in order to achieve the global targets on protecting the health of children." Diarrhoea in addition to acute respiratory infections continues to claim millions of young lives each year (Boschi-Pinto et al, 2008; WHO, 2009). Statistics also indicates that pneumonia and diarrhoea cause the death of 2 million children annually and constitute 29% of under-five mortality rate globally (WHO/UNICEF, 2013). Epidemiological studies have also shown that microorganisms transmitted are mostly associated with enteric and respiratory diseases with significant variations described in diarrhoea episodes of children attending early childhood centres to those staying at home (Nesti & Goldbaum, 2007). These diseases are avoidable and do not require

sophisticated technologies to do so. Among the preventive strategies to address this phenomenon, hand washing with soap (HWWS) has been shown to be very crucial (Monney et al, 2014) reduces diarrhoea morbidity by 44% among schoolchildren (Vivas et al., 2010). In addition, HWWS has been shown by various studies to reduce absenteeism from school due to illness (Bowen et al., 2007; Lau et al., 2012). Studies focusing on absenteeism caused by gastrointestinal and respiratory-related illnesses in industrialised countries show that as the result of improved hand hygiene in schools the number of days lost can drop between 25 and 50 % (UNICEF, 2012).

Proper hand washing consists of wetting the hands, applying soap, and lathering for at least 20 seconds before rinsing off the soap in running water (Shope, 2014). Health Protection Agency (2010) consequently recommends staff and children to use liquid soap and disposable paper towels during hand washing however sharing bars of soap and towels can spread microorganism from one person to another.

In the absence of water and soap, hand hygiene performed with the use alcohol hand rub has been recommended. WHO (2015) is of the view that although washing hands with soap and water remains an accepted method for routine hand antisepsis, alcohol-based handrubs should be promoted as the gold standard for hand hygiene considering, in particular, their dramatic impact on improving compliance with hand hygiene and ensuring clean, safe hands. Correa, Pinto, Salas, Camacho, Rondón and Quintero (2012), in a cluster-randomized controlled trial study in Colombia (a developing country) found out that, gastrointestinal diseases were reduced by 30%. The study took place in 42 childcare centres including preschools where there was a sporadic

limited availability of water, non-functioning sink and a maximum population of 30 children in class. Scott, Curtis, Rabie and Garbrah-Aidoo (2007) also found out that the use of alcohol hand rub was cheaper to that of soap dispenser, perceived convenience and satisfaction among teachers of the childhood centre. This is because liquid soap are expensive for these communities in low income countries. Nevertheless, the amount of money involved in buying a hand rub for a large number of children can buy twice the amount of liquid soap in the Suhum Municipality. CDC's Report says that alcohol-based hand sanitizers typically contain isopropanol, ethanol, n-propanol, or a combination of these chemicals at a concentration of 60% to 95% alcohol. The chemicals have excellent in vitro germicidal activity against Gram-positive and Gram-negative vegetative bacteria (including multidrug-resistant pathogens), M. tuberculosis, and a variety of fungi lipophilic viruses such as herpes simplex virus (HSV), HIV and influenza virus. However, they have virtually no activity against bacterial spores or protozoan oocytes. This means that the use of hand washing with soap is rather recommended instead of promotion of extensive use of alcohol-based handrubs due to vast occurrences of diseases associated with parasitic organism in tropical settings. Secondly, the potentially toxic exposures and significant health consequences of the alcohol (isopropanol, ethanol, n-propanol) on children in early childhood is to be considered because of ingestion possibility by these children (CDC, 2011).

In all instances, it is recommended that hand hygiene be formed upon arrival for work in the day cares or when moving from one child care group to another; before and after eating, handling food, or feeding a child, giving

medication. Furthermore, hand hygiene should be performed after diapering, using the toilet or helping a child use a toilet, handling bodily fluid (mucus, blood, vomit) from sneezing, wiping and blowing noses, from mouths, or from sores and cleaning or handling the garbage (AAP, 2011).

Respiratory Hygiene

Illnesses may be spread in a variety of ways, such as by coughing, sneezing, direct skin-to-skin contact, or touching a contaminated object or surface. Respiratory tract secretions that can contain viruses (including respiratory syncytial virus, rhinovirus and norovirus) contaminate environmental surfaces and may present an opportunity for infection by contact (Grenier & Leduc, 2008). Children and adults are to be encouraged to cover their mouth and nose with a tissue, wash hands after using or disposing of tissues. Likewise, spitting should be discouraged (public health agency, 2013).

Rui, Chao, Chen,Yao, Hu & Lin (2015) in their paper "Status of the knowledge, attitudes, behaviours, and requirements on Norovirus prevention and the prevalence of asymptomatic norovirus infection" in kindergartens and primary schools in Changzhou, China among five hundred and seventy-four teachers from kindergarten indicated that schools in the suburban counties needed more education on norovirus prevention.

Disinfection

Childcare surfaces are vehicles for disease-causing organisms for which disinfectant procedures prevent microbial dispersion (Jimenez, Celida, Martinez & Chaidez, 2010). Lynn and Westinghouse (2010) define disinfection as a process that is used to reduce the number of viable

microorganisms on a surface but that may not necessarily inactivate to all microbial agents (example spores and prions). Disinfection is generally accomplished in a childcare setting by the use of liquid chemical solutions such as a mixture of household bleach and water. Chaidez et al. (2011) conducted an intervention study with 40 children to investigate the contamination of children's toys and their hands during play, detected faecal coliforms on both toys and children's hands. Klebsiella pneumonia was found on hands at a mean concentration of 2.7 × 102 log CFU/50 cm2 per toy. E. coli was found at a mean concentration of 2.4 × 102 log CFU/50 cm2 per toy, which meant that environmental contamination by enteric bacteria and viruses on shared objects such as toys in the child-care setting through mouthing behaviour provides the opportunity for ingestion of enteric pathogens, especially in infants and toddlers. In addition, the literature review conducted by Lee and Greig (2010) concerning gastrointestinal outbreaks in schools shows that vomiting during a gastrointestinal illness can result in contamination of the environment, especially, norovirus particles can be aerosolized during vomiting episodes. Rotavirus can be 100 times more concentrated in vomitus than in faeces as well as norwalk virus. Hence, cleaning and disinfecting toys and contact surfaces at childcare centres prevent microbial dispersion (Cosby et al. 2008). North Carolina Child Care Sanitation rules (2007) recommend chlorine-based solutions to disinfect food-contact surfaces and toys. These solutions are proven to be the most used and efficient disinfectants; however, special care must be taken when preparing the solution concentration to avoid toxic effects if children are exposed.

Water, Cleaning and Sanitation

The global burden of disease and mortality rates could be reduced by about 9.1% and 6.3%, respectively, if rapid success is attained in facilitating access to water, sanitation, and hygiene facilities (Pruss-Ustun, Bonjour & Corval, 2008). According to Sanders, Bradshaw and Ngongo (2010), inadequate sanitation, water supply and poor hygienic practices increase exposure to infectious diseases especially diarrhoea. Globally, new diarrhoea cases estimated at 4 billion which contribute to the mortality rate of about 1.9 million annually especially among children under five years old whiles developing countries account for around 19% of those mortality rates (Boschi-Pinto, Velebit & Shibuya, 2008). Consequently, poor sanitation associated with diarrhoea and other diseases compromises children's health, safety and nutritional status because young children are particularly vulnerable to illnesses such as diarrhoea and cholera that is associated with poor water quality. Even in drinking water, a Norwegian study to determine the occurrence, distribution, and significance of mould species in found 94 mould species belonging to 30 genera, including Penicillium, Trichoderma, and Aspergillus spp. In drinking water, of these, Penicillium spp. were abundantly distributed and appeared to survive water treatment (WHO, 2009). Impaired cognitive learning performance are long-term outcomes of the negative effects of infections such as diarrhoea, worm infestations and dehydrations which are largely attributed to poor water, sanitation, and hygiene conditions (Gottfried, 2010). Diarrheal incidences in children during their first few years of life have been shown to limit their growth by about 8cm and cause an IQ point reduction when they progress to about 7 or 8 years of age (Guerrant,

Deboer, Moore, Scharf & Lima, 2013). Joshi and Amadi (2013) in their study use a combination of randomized controlled trials, cross-sectional studies, cohort studies, and case series on knowledge of water, sanitation and hygiene (WASH). The study concluded that the importance of access to safe water and hygiene education could not be underscored in abating water-borne illnesses, school absenteeism, and generally improving the quality of life and learning performance in children. The studies assessed the health and educational effects of WASH practices in schools on reducing absenteeism and diarrhoea prevalence/infections among school-age children on a short term. However, there have not been little nor empirical studies that examined the long-term impact of WASH interventions on child health outcomes, and therefore limited data to support future intervene (Auckland Regional Public Health Service, 2013) studies have shown that about 75% of all school absences are illness related and information regarding absenteeism from middle and higher income countries has shown that poor academic and social development, high dropout rates, and reduced learning performance are attributed to school absence in children.

The cleaning and sanitation of the childcare environment include cleanliness of floors, bathrooms (toilets, floors) trash collection, classroom materials, and furniture and equipment. National regulation requires childcare providers to keep their premises and equipment clean using appropriate cleaning procedure because there the possibility that a surface could become a source of infection with the aim to reduce the number of microorganisms to a level where there is no longer a threat to health.

Diapering Hygiene

Environmental contamination has been associated with increased diarrheal rates in childcare facilities (Healthy Child Care, 2006). Children of all ages that are incontinent of urine or stool need to wear a barrier method to prevent contamination of their environment. According to Barker and Jones (2005), pathogens can exist in faeces in concentrations from 104 to 1011/g indicating that even a tenth of a milligram of faeces on the skin, barely noticeable, could contain up to a million infectious viral particles, parasitic oocytes, or bacterial cells. Examples of the infectious agents are *Campylobacter*, *Giardia*, *Hepatitis A*, *Salmonella*, *and Shigella* are all spread in stool or urine from infected persons through faecal contamination of objects in the environment , hands of teachers and children (Disease Control Services, 2009). Thus, procedures that reduce faecal contamination, such as minimal handling of soiled diapers and clothing, thorough hand hygiene, containment of faecal matter and articles containing faecal matter control the spread of these diseases. Diapers worn by children should be able to contain urine and stool and minimize faecal contamination to children, teachers, environmental surfaces, and objects in the childcare setting. Only disposable diapers with absorbent material (example polymers) may be used unless the child has a medical reason that does not permit the use of disposable diapers (such as allergic reactions). Faecal contamination in the centre environment may be less when single-use, disposable diapers are used than when cloth diapers worn with pull-on waterproof pants are used (AAP, 2014). However, if cloth nappies are used, the soiled cloth diapers should be completely wrapped in a non-permeable material, stored in a location inaccessible and sent to the child's individual

home. Furthermore, only designated area are needed to change diapers which should be separated from any food storage, food preparation area or eating area as well as objects, such as pacifiers, toys, baby bottles. National Health and Medical Research Council (2012) recommends staff members to put on disposables gloves before changing of a baby's diaper and thereafter dispose of soiled nappy or diaper with wipe into an individual nappy sack before placing into a bin lined with a plastic liner with a secure lid, operated by a foot pedal. Moreover, if a child needs to be washed completely then a sink with running water, which is thoroughly clean, is needed. Thereafter disinfect the sink as well as changing area with detergent after use (NHS, 2006).

Kotch et al. (2007) on behavioural change strategies for reducing diarrhoea in out-of-home childcare posit that, reducing diarrhoea might be more effective if this source of contamination is controlled. In their study, twenty-three pairs of childcare centers were matched on size and star rated license level. One member of each pair was randomly assigned to an intervention group and the other to a control group. Intervention centers received new diaper-changing and hand-washing equipment. Both intervention and control centres received hygiene and sanitation training with reinforcement and follow-up as needed. The results of the study showed that diapering and hand-washing equipment specifically designed to reduce the spread of infectious agents' significantly reduced diarrheal illness among the children and absence because of decreased illness among staff in out-of-home childcare centers. Concisely, improved staff hygiene and sanitation behaviour, state-of-the-art diapering and food-preparation equipment were necessary for optimal prevention of diarrheal illness. Long-term follow-up with reinforcement of

correct sanitation and hygiene behaviours resulted in steady improvement in the correct sequence of the behaviours over 7 months in both the intervention and control centres. Kotch et al. (2007) further went on say that, the impact of the equipment can add value to the impact of training in proper diaper-changing and hand-washing that has been observed in previous studies.

Protective Clothing

CDC (2007) recommend teachers to wear disposable gloves when there is the likelihood of coming to come in contact with body fluids or excretions, such as when changing nappies or cleaning up vomit or blood. Nevertheless, wearing gloves does not replace the need to wash hands .An individual should ensure that hand hygiene is performed before putting gloves on and after taking them off (National Health and Medical Research Council, 2012). Powder-free gloves are preferable, because powdered gloves may contribute to latex allergies in educators and other staff.

Management of Sick Children and Teachers

Teachers need to be physically and emotionally healthy to perform the tasks of providing care to children. Performing their work while they are ill can spread infectious disease and illness to other staff and the children in their care (Murphy, Palmer & Glassy, 2005). Staff members are responsible for reporting immediately to their supervisor any or illnesses they experience at the facility or elsewhere, especially those that might affect their health or the health and safety of the children. It is the responsibility of the administration, not the staff member who is ill to arrange for a substitute caregiver/teacher. This is because adults report to work when feeling ill or become ill during the day but believe it is their responsibility to stay. The administrator or teacher's

observation of illness followed by sending the staff member home may prevent the spread of infectious diseases. Arranging for a substitute teacher ensures that the children receive competent care (Baldwin, Gaines, Wold, & Williams, 2007).

Secondly, children who have contracted certain infectious diseases such as chicken pox and measles are to be excluded from school until rash disappears in other to prevent further spread to other children and the teachers as well especially pregnant teachers. If an outbreak is suspected then, the public health unit is to be notified. Certain child care facilities also have temporal designated area (sick bay) for housing sick children until their prospective parents/guardian comes for them clinic. In terms of knowledge and practices concerning enteric illness management, Taylor, Adams, and Ellis (2008) found out that staff used personal experiences in making decisions concerning enteric illness that is normally different from public health guidance particularly when faced with challenges such as money, time, staffing and parental issues. Staff used an indirect observation and surveillance based on a child's behaviours, nature, consistency and colour of bowel movement. They were also able to detect when an enteric disease was infectious especially when two or children were exhibiting the same diarrhoea symptoms. In order to prevent environmental contamination, water and bleach was used to clean faecal matter.

Pre-Employment Health Assessment and Immunizations

Health protection surveillance (2012) argues that staff in childcare settings be managed largely in the same way as healthcare staff and recommended that all staff undergo some form of pre-employment health

assessment (PEHA). The health in particular, assess their immunity to childhood viral diseases example Chickenpox, Hepatitis B, Measles and their need for protection against infections, which could be occupationally acquired. For those working in an environment where transmission of infection may be a risk (example in crèches), the PEHA affords an opportunity to review the employee's immunization status and to provide vaccines which may be necessary to protect them. All teachers who are at risk of occupational exposure to blood or other blood-containing body fluids should be offered Hepatitis B immunizations. The 1994 Regulations indicate that it is the duty of the employer to provide vaccines, when necessary, for non-immune staff should they be (or are likely to be) exposed to a biological agent. The term "biological agent" will encompass infectious disease including those that are likely to be carried by children in a congregate, childcare setting. Accordingly, an employer employing staff in a childcare facility would have a legal requirement to provide vaccination against certain diseases once their presence is confirmed amongst staff or children in the facility. Equally, employees have a legal duty to cooperate with their employer on matters of safety at work (example utilize appropriate personal protective equipment (PPE) and to attend relevant training). Staff members have a responsibility to comply with occupational health advice and should sign a disclaimer if they choose not to protect themselves with vaccinations made available for their protection.

All members of staff should undergo a full occupational health check prior to employment; this includes ensuring they are up to date with immunizations. All staff under the age of 25 should be advised to check they

have had two doses of Measles Mumps Rubella vaccine. Childcare staff that are appropriately immunized pose a significantly smaller risk to the children in their care and, are in turn, protected against the dangers that certain vaccine preventable infectious diseases pose to themselves and to their unborn children (pregnant teachers). A review and certification of up-to-date immune status per the current Recommended Adult Immunization according to national immunization schedule. Teachers' health appraisal before their first involvement in childcare work which should include physical examination, dental examination, vision and hearing screening before their first encounter with children at childhood centres. Additionally, it is recommended that, pre-employed staff performs a tuberculosis test, before employment. The results and appropriate follow up of a tuberculosis (TB) screening, using the Tuberculin Skin., once upon entering into the child care field with subsequent TB screening as determined by history of high risk for TB thereafter. Studies have shown that their teachers have infected schoolchildren with tuberculosis. Even in low incidence countries like Italy where prevalence is low 62 school children in a kindergarten were infected with tuberculosis (Filia, Ciarrocchi, Belfiglio, Caferri, Bella, Piersimoni, Cirillo, Grilli, Mancini, & Greco, 2011). In the same way, 35 children in a Swedish day-care centre were also infected with Tuberculosis (Gillman, Berggren, Bergstrom, Wahlgren & Bennet, 2008).

In Ghana, a high prevalence of tuberculosis among individuals calls for Ghana Education Service and Ministry of Health to mandatorily allow teachers and other staff of childhood centres to undergo tuberculin testing

before employment since it is evident that most schoolchildren have tested positive to the tuberculin bacilli through the study done by Addo et al. (2008).

Training of Teachers on Infection Prevention Measures

Knowledge is one of the measures, which are taught to be causal pathway of behaviour (Nandrup-Bus, 2009). Poor knowledge and practise of personal hygiene has negative consequences for a child's long-term and overall development (Scott, Curtis & Aidoo, 2007). As ECCE has recently been extended to low- and middle-income countries, their structural characteristics might be weaker than the educational characteristics provided in the early Childhood Care and Education Programmes (UNESCO-UIS, 2009). It is important that all members of staff have a clear understanding of their role in preventing the spread of infection. According to UNICEF, teachers in low and middle-income countries are five times more than health personnels of whom they require a certain level of hygiene awareness, commitment to become effective promoters and implementers of school, sanitation and hygiene. Teachers require appropriate training and supervision to become familiar with the policies and procedures that are in place to prevent and control infection in childcare settings (HPA, 2006). A less educated staff might pay less attention to children unhygienic behaviours such as putting toys in their mouth and consequently lack awareness of potential transmission paths of diseases. Teachers should receive annual training in Standard Precautions and exposure control planning which should be consistent with applicable standards of the Occupational Safety and Health Administration (OS). In addition, Policies should be written in consultation with a health care professional serving as a childcare health consultant of which these policies should be the basis for

regular training of staff members about infection control and prevention. UNICEF (2008) went further to say that, if national governments want schools to take up responsibility for improving the school environment, then plans have to be developed for teachers training curriculum. The basic professional training of schoolteachers should take account of education related to sanitation and hygiene and to a participatory way of working. In addition, teachers already in service have to get the opportunity to upgrade their knowledge and skills in this respect. Consistent collaborative workshops involving schoolteachers, health workers, planners, can contribute meaningfully to the necessary cooperation and coordination of activities. Education and training of school staff on adequate cleaning and disinfection procedures is to be considered, including a schedule of when and where to clean – signatures/dates when performed, detergent and water for general environmental cleaning and cleaning of soiled areas prior to disinfection (ECDC 2013). Information should also be given on how to manage spillage of body fluids as well as the use of personal protective equipment (example, disposable gloves and apron) in cleaning up vomit and other body fluids. Teachers are also encouraged to raise concerns about the level of cleanliness in the school setting. Chan and Kitzmann (2010) explored preschool teachers' health beliefs and revealed indirectly their levels of health concerns. Their study findings provided useful information for planning health promotion and health education curricula for teacher training. According to Chan and Kitzmann (2010), developmentally appropriate curricula should focus on socio-culturally based beliefs and attitudes related to teachers' special orientation to health. Chan and Kitzmann (2010) further states that research is

needed to examine how teachers' health beliefs change over time, and show these beliefs are translated into preschool practices, health curricula and teacher– parent communication about child health

Practices of Teachers, Availability of Resources and Barrier to the Practice of Infection Prevention in Early Childhood Educational Centres

Despite CDC (2007) regards the use of shared basins for handwashing as inadequate in ridding the hands of pathogens, Monney, Dwumfour, Owusu, Badzi (2014) found 15 schools out of 20 schools using shared basin with the other 5 schools using functional hand washing stations with plastic/metal storage containers with taps and stand pipes constituted. Further studies indicated that these shared basins, mostly plastic basins were relatively cheaper which the school authorities interviewed found this 'financially convenient' to acquire them as compared to the veronica bucket, functional sinks and liquid soap dispensers. According to the school authorities, there is lack of independent funding mechanism for such purpose and therefore, over the years, the head teachers have relied mostly on the untimely release and inadequate annual grant capitation grant from the central government for the provision of the handwashing stations. Correspondingly, Boateng (2008) in his descriptive cross-sectional study in Kwabre District of Ashanti Region showed that about 60% of schools did not have potable water on the compound for the schoolchildren. The pupils had to buy from ice water sellers in the compound that meant that the probability that a pupil refuses to wash his/her hands after attending to natures was high. Five schools had boreholes, of which three schools were not user-friendly especially for the little children because of their inability to draw the water on their own. Indeed, nine schools had washing

bowls for pupils to wash their hands but none had put them in use as of the time their schools were visited. These bowls were locked up in offices for keep. Enquiries were made to ascertain why that was so, and the answers were same. Thus, there was either no water or issues about the maintenance of these bowls. The issue of capitation grant in Ghana is normally applicable to public schools; nevertheless, private schools set up by individuals should be able to provide the recommended hand washing materials (liquid soap, running water, functional sinks or veronica bucket and disposable towels) for use in the early childhood education centres.

Rosen, Zucker, Brody, Engelhard and Manor (2007) investigated hand hygiene intervention program using a cluster-randomised trial on 80 preschool educators and 40 preschools of age range 3-4 years. The Jerusalem Hand washing Study was designed to change hand washing behaviour and so decrease illness absenteeism among pre-schoolers by having a training section on hand hygiene with soap, washing of hand after visiting the bathroom and before lunch. The results of the study showed both preschool teachers in the control and the intervention group 'knowledge on hygiene was not to be under estimated. Educators believed hand washing affected health and the educators had positive attitudes toward hand washing a believed that hand washing was important in disease control. This is because they work in an environment that is the centrality of transmission of communicable disease in the community, and as such play a crucial role in the battle against these diseases through enforcing hand washing regulations among themselves and the children they teach. In addition, the study concluded that education alone is insufficient to change behaviour. However, a change of behaviour must be augmented by

other provisional enabling factors such (soap, soap dispensers, paper towels, paper towel dispensers and individual cups). Similarly, Zomer, Erasmus, van Beeck, Richardus & Voeten (2013) observational study on hand hygiene compliance and environmental determinants in child day care shows that hand hygiene compliances cannot be effective without, number of sinks, number and type of towel and soap facilities, availability of alcohol-based hand sanitizers. The study found out that the type of towel facilities was significantly associated with hand hygiene. Schmidt, Wolch, Brian, Curtis & Mangtani's (2009) pilot study in East London pointed out hand hygiene intervention is feasible and accepted by teachers in childcare centres in temporal situation especially in public health treat such as the HINI influenza. Teachers' motivation and enforcement of hygienic behaviour is educational rather than immediate infection control. The statement true to some extend for instance during the Ebola pandemic in west Africa and cholera outbreak in Greater Accra Region public institutions inclusive of early childhood centres intensified hand hygiene practise. Zomer, Erasmus, van Beeck, Tjon-A-Tsien, Jan Hendrik, Richardus, & Voeten (2013), in a survey of 122 participating day care centers and 350 caregivers, indicated that although hand hygiene (HH) has proven to be an effective measure to prevent infections, HH compliance is generally low. When developing HH interventions for caregivers in day care centres, improving guideline knowledge should be considered as this was associated with both observed and self-reported HH compliance. Furthermore, increasing guideline awareness, perceived importance, and perceived behavioural control can contribute to better HH, as well as making HH a habitual behaviour.

Enand and Gan (2011) is of the view that structure, cleanliness, and general outlook of latrines are implicated in the rate of utilization of sanitary facilities by the school children, with children being more likely to utilize well-kept sanitary facilities or outside sources. Currently, records from the Suhum Municipality School Health Education Programme (SHEP) coordinator indicates that averagely fifty (50) children share one toilet facility in the childcare centres that contradicts UNICEF ratio of children 20 children per one toilet facility. AAP (2014) also recommends 10 children to one toilet facility that should be accompanied by hand washing facility. For that reason adequate cleaning of toilets and urinals, one with the appropriate disinfectant and detergent is necessary to prevent the spread of disease and promote health through safe and hygienic waste disposal in children.

In some of the rural communities in Ghana, children in public childcare centres use the same toilet facilities with primary student because most of the childcare centres are attached to primary as well as junior high schools. Boateng (2008) found as much as 15 out of the 30 schools had no toilet facilities. Pupils also used the toilet for the whole community. Among the 15 schools that had toilet facilities, only two kept this facility well maintained and clean. These were the schools that had benefitted from the Highly Indebted Poor Country (HIPC) initiative for that. The study further indicated that both the toilet and urinal facilities were poorly maintained making it unconducive to the health of the children. Again, an inspection of the waste disposal sites of the schools revealed poor maintenance and littering around the site.

Standard and Polices of Suhum Local Municipality Concerning Infection Prevention Strategies

All early childhood education establishments must have good general hygiene programs that include hand washing with soap under running water using veronica buckets. The education service also request these facilities to have potable water usage, functional toilet and urinal facilities. The standard of the municipality states that the number of classrooms should correspond to the number of toilet facilities as well as urinals. Currently, 50 students are to handle one-toilet facilities. In addition, every early childhood education is to organize for periodic eye, ear test and general screening for the school children. As part of the municipal responsibility to the schools, the School Health Education Program (SHEP) coordinator, in collaboration between the Environmental Sanitation Unit and Ghana Health Service conducts monitoring and evaluation services to the schools as well as health education on general hygienic measures on children for the teachers in the municipality (Ghana Education Service Municipal Office, 2015).

Summary of Literature Reviewed

Infection in childhood education centres are caused by viruses, bacteria, fungal and protozoa. These harmful micro-organisms find themselves in the bodily fluids such as urine, faeces, blood and nasal secretion of the children being handled as well as caregivers in the school. Transmissions of the diseases are therefore augmented because of infectious toys put in the mouth by the children, ccoughing or sneezing near another person may pass on these viruses in the droplets or aerosol produced. The disease-causing organism through contact with faeces, direct contact with skin especially in the

case of fungal, scabies and lice infection can also be transmitted. Other sources of infection in the school survive on objects such as toys, door handles, classroom floors, toilet handled, latrine seats. In order to break the chain of infection at any point through; effective hand hygiene, exclusion of ill children, educating of staff and children and other staff, immunization, cough and sneeze etiquette, appropriate use of gloves, effective environmental cleaning are recommended (NHMRC, 2012). Improvements in hygienic behaviour are the most important barriers to many infectious diseases because with behaviour and appropriate facilities, people reduce their risk of becoming exposed to diseases (Nath, 2009). Knowledge and attitude on hygienic behaviour of teachers coupled with factors like availability of resources like latrine facilities and safe water supply can address lasting changes in hygiene behaviour.

Theoretical Frameworks

Two theoretical frameworks, which are: an adapted Theory of Agent Host Environmental Model and an adapted version of the Florence Nightingale Environmental Theory, guided the study. The Agent-Host-Environmental Model, also known as Leavell and Clark's Ecologic Model (Leavell & Clark, 1965), examined the cause of disease in an individual. The interaction of the agent-host-environment creates risk factors that increase the probability of disease hence understanding the interaction is important for the promotion and maintenance of health. In the model, the agent functions as the factor that must be present or absent for the illness to occur whiles the host is the living being that the agent affects. The environment is everything outside the host that

makes the disease more or less likely (Leavell and Clark, 1965). The theory is summarised in Figure 1 below:

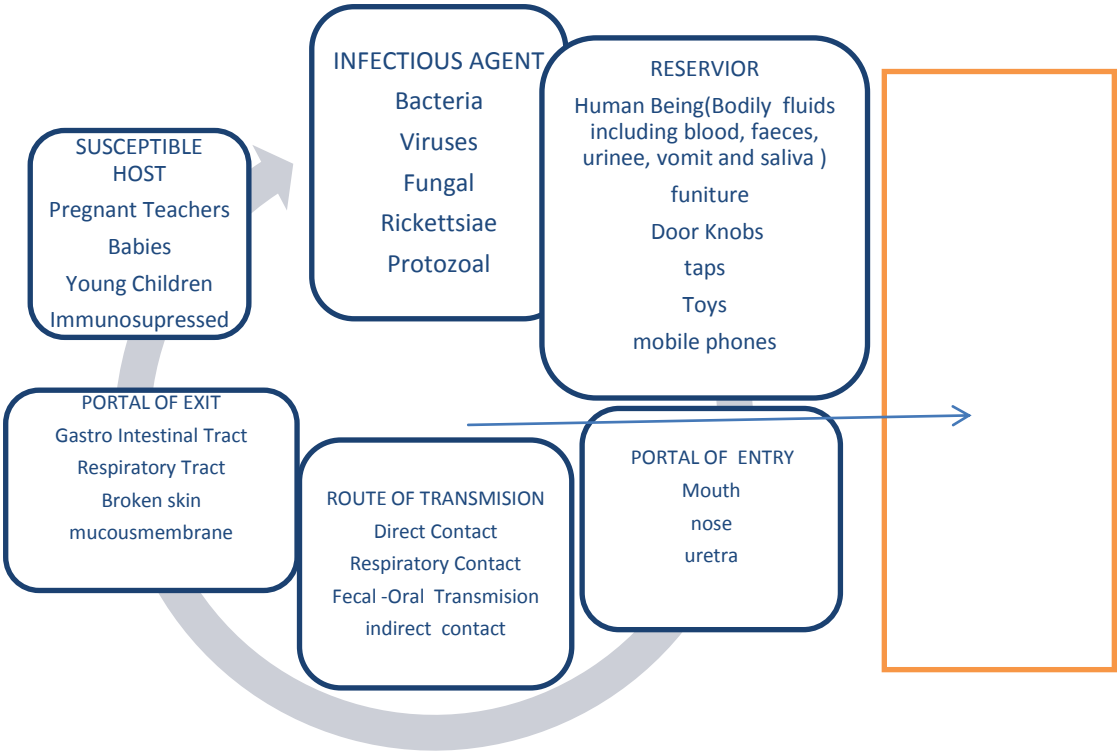

Figure 1: An Adapted Agent-Host-Environmental Model by Leavell and Clark (1965)

Florence Nightingale Physical Environmental Theory (1980)

The model talks about essential components of healthy environment, which are good ventilation, pure water supply, environmental cleanliness as well as personal cleanliness. In other words, the model indicates the critical nature of the impact of the environment on the health and well-being of the individual. According to Florence Nightingale, the essential components of a healthy environment are external influences and conditions that can prevent, suppress, or contribute to disease or death. A client and the external environment must be in balance. Once the environment of a client is out of balance, the client expends unnecessary energy that leads to the development of a disease

(Libster, 2008). With respect to infection prevention in early childhood education centers, the teachers' initiative to configure environmental settings appropriate for the promotion of health in children is vital in biological and physiological development of the children. It is a teacher's role to help her students to retain their own vitality by meeting their basic needs through control of the environment for instance personal cleanliness such as frequent washing of hands with soap under running water after handling of bodily fluids. Nightingale viewed the functions of the skin to be important, believing that many disease "disorders" are caused by breaks in the skin. So it is necessary to keep pores of the skin free from all obstructing excretions." In addition, the provision of safe water, sanitation facilities, as well as activities to promote good ventilation in schools is a first step towards a healthy physical learning environment benefiting both learning and health.

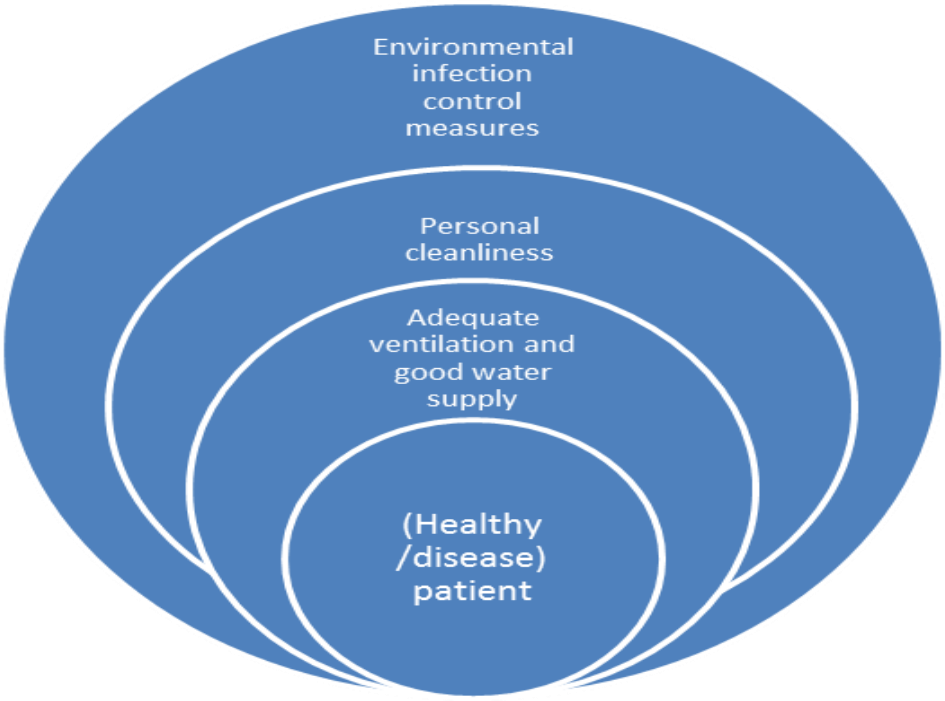

Figure 2: An Adapted model from Florence Nightingale Physical Environmental Theory (1980).

CHAPTER THREE

METHODOLOGY

Introduction

This chapter outlines the methodological procedures that were employed in the study. To this end, the chapter presents the research design, the study location, the target population, sampling procedures and sample size, research instruments, validity and reliability, data collection procedures and data analysis.

Research Design

The study employed a descriptive quantitative comparative survey design. This design is appropriate for the study since it compares more than two variables between public and private early childhood education centres in a natural setting without any intervention or manipulation in the environment.

Settings

The research was conducted in 52 randomly-selected public and private early childhood education centres in the Suhum Municipality. The Suhum Municipal is organised into three zonal centres, which are: Suhum, Nankese and Akorabo. Among, the 3 zones, the Suhum Zone is the only urban zone among the three. In other words, the municipality has both urban and rural settings with which early childhood centres have been established. The condition in urban areas differs considerably from the rural setting. Many schools in the urban towns have access to the town's water supply and their toilets may be connected to the town's sewage system. Issues of maintenance, in addition to upgrading possibilities, is different for rural and urban areas and problems related to hygiene behaviour are likely to differ. The results of

different environments in which children find themselves may be different for urban and rural areas. However, the approaches for assessing and monitoring infection prevention practices are the same.

Study Population

The study population included teachers from public and private early childhood education centres registered under the Ministry of Education within the Municipality. Teachers above 18 years were eligible for the study.

Sampling Technique

The simple random sampling technique was used to select 52 private and public early childhood education centres and an equal number of selected teachers were distributed among the selected schools targeted for the study. Random selection was conducted by numbering all registered childhood education centres inclusive of crèches, nurseries and kindergartens. A computer-based random number generator was used to identify the chosen sample for the study. Similarly, the list of names of childhood education teachers was obtained and randomly selected using the lottery method.

Sample Size Calculation

Total population of teachers in early childhood education centres in Suhum Municipality was 255 teachers (Suhum Ghana Education Service Municipal Office Report, 2015). The study used a Confidence interval (margin error) of five, with 95%, as confident level and a percentage of 50% distribution, which is the most conservative, and a constant z- score of 1.96. In all, one hundred and sixty (160) teachers were selected as the target population for the study; 80 teachers were selected from the public schools whereas the other 80 teachers were selected from the private childhood education centres.

Data Collection Instruments

The study employed questionnaires as the data collection instrument.. There were five sections of the designed questionnaires, which employed Likert scale questions. The first section elicited demographic information about the teachers in the early childhood educational centres. The second and third sections covered the knowledge level as well as practices regarding key areas of infection prevention based on infection prevention policies enacted by the local municipality and international standards of infection prevention in schools. Key areas with regard to causes of infection, sources of infection, disease transmissions and the concepts of infection in early childhood education centre were addressed in the questionnaire.The fourth section was designed to identify the available resources concerning infection prevention in the learning centres. Finally, the fifth section addressed questions relating to the barriers to infection prevention practices.

Data Collection Procedure

The questionnaires were self –administered to the selected respondents and were retrieved after 48 hours. The researcher, without any assistance, retrieved answered questionnaires.

Reliability and validity

Pre-testing of the study tools was done in four schools to check the appropriateness of the study tools in the Amanase District. A Cronbach's Alpha, based on Standardized 112 items, was designed before the actual data collection of data. The data recorded a value of 0 .869 which is suggestive of a very good internal consistency reliability of the scale.

Data Analysis

Due to various non-normality and normality distribution characteristic properties of data, descriptive analysis including variables such as mean, mode, and percentages in combination of Mann Whitney U test for non-distributed variables, independent t test and one-way ANOVA test for normal distributed data from SPSS version 20 was used to analyse data from the study.

Ethical Consideration

The Ethics and Research Board (Institutional Review Board) of the University of Cape Coast reviewed the study protocol to ensure all requirements on research in dealing with human participants were met. Permission to conduct the study was requested from the Ghana Education Service (GES) of the local municipality and from the Management of the various selected schools. Consent was sought from individual respondents who were teachers of the early childhood education centres. The respondents were also informed that their participation in the study was voluntary and that they could opt out any time they wanted. The objectives of the study were explained to the respondents before data collection and information collected was treated with strict confidentiality.

Delimitations of the Study

The study focused on knowledge level as well as practice on infection prevention among public and private school teachers in early childhood education centres in the Suhum Municipality only. Components of the infection prevention practice included hand hygiene, disinfection of used toys, diapering activities of caregivers and general sanitation practices in the school.

Similarly, components of knowledge level were limited to the source of infection, disease transmission and prevention of diseases in the schools. In addition, resource availability and barriers to the practiced of infection prevention were covered.

Limitations

The literature search on empirical evidence of knowledge level of teachers regarding infection of early childhood education centres was a challenge that resulted in inadequate comparison of present study to previous study. Secondly, responses given by the teachers might not reflect the actual practices of the teachers. It is possible that socially accepted answers were given.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents the discussion of the results from the analysed data. Statistical tools were used in analysing the data and I present in this chapter, the analysis of the data based on the research objectives and the literature reviewed. A combination of parametric and non – parametric tools in addition to descriptive statistic from the SPSS version 20 was used to comparatively analyse a survey data collected from the 160 teachers from public and private childhood education centres. Discussions of analysed data included the demographic features of the teachers sampled for the study and its impact on the knowledge level, practiced level, resource availability and barriers on infection prevention practice. Comparatively, the knowledge level, practiced level, resource availability and barriers to infection prevention were

Demographic features of teachers in the early childhood education centres

Table 1- *Gender of Teachers*

Gender of Teachers		Frequency	Percent	Valid Percent	Cumulative Percent
Public School Teachers	Male	3	3.8	3.8	3.8
	Female	77	96.3	96.3	100.0
	Total	80	100.0	100.0	
Private School Teachers	Male	8	10.0	10.0	10.0
	Female	72	90.0	90.0	100.0
	Total	80	100.0	100.0	

Table 2- *Mann-Whitney U Test for Gender of Teachers on Knowledge Level of Infection Prevention*

	Knowledge Level of Teachers on Infection Prevention
Mann-Whitney U	663.500
Wilcoxon W	729.500
Z	-1.052
Asymp.Sig. (2-tailed)	.293
Grouping Variable: gender of teachers	

Table 3- *Mann –Whitney Test for Gender of Teachers to Infection Prevention Practices.*

	Infection Prevention Practices by Teachers
Mann-Whitney U	456.000
Wilcoxon W	522.000
Z	-2.457
Asymp. Sig. (2-tailed)	.014
Grouping Variable: gender of teachers	

As stated earlier and can be seen from Table 1, eighty (80) public and 80 private teachers of early childhood education centres were sampled for the study. The following were the gender distribution of the teachers: female public teachers were 77 (representing 96.3%) while female private school teachers were 72 (representing 90%). As regards the males, it is seen from Table 1 that the male public school teachers were 3 (representing 3.8%) while the male private school teachers were 8 (representing 10%). Using a chi-square to analyse the data, I found that the variation in number in terms of the gender of the public and private school teachers was a statically significant

(p =0.001), where X2 =68.450ab and 51.200[a] respectively. Consistently, there was no statically significance difference in relation to gender of teachers and knowledge level of teachers after an independent sample test Mann Whitney U test was conducted. The test recorded (p = 0.293) at significance level of 0 .05. However, the analysis proved that there was significant difference in relation to the practice of infection prevention and gender of teachers (p = 0.014) at a significant level of 0 .05.

Table 4- *Ages of the Teachers*

	Ages of Teachers	Frequency	Percent	Valid Percent	Cumulative Percent
	18-24 yrs.	3	3.8	3.8	3.8
Public	25-34 yrs.	17	21.3	21.3	25.0
School	35-44 yrs.	18	22.5	22.5	47.5
Teachers	45 yrs.+	42	52.5	52.5	100.0
	Total	80	100.0	100.0	
	18-24 yrs.	32	40.0	40.0	40.0
Private	25-34 yrs.	24	30.0	30.0	70.0
School	35-44 yrs.	12	15.0	15.0	85.0
Teachers	45 yrs.+	12	15.0	15.0	100.0
	Total	80	100.0	100.0	

Table 5- *ANOVA Test for Effect of Ages of School Teachers on Knowledge Level of Infection Prevention*

School teachers		Sum of Squares	Df	Mean Square	F	Sig.
Public school teachers	Between Groups	38.321	42	.912	1.199	.289
	Within Groups	28.167	37	.761		
	Total	66.488	79			
Private School Teachers	Between Groups	41.217	43	.959	.682	.885
	Within Groups	50.583	36	1.405		
	Total	91.800	79			

As can be seen from Table 4, the descriptive analysis showed that a majority (representing 52.5%) of the teachers in the public childhood education centres were 45 years and above while the least ages were between 18 to 24 years (representing 3.8%). The analysis further revealed that the private childhood education centres had a majority of the teachers (representing 40%) between the ages of 18 and 24. Again, a one–way analysis of variance of the ages of the teachers showed a significant difference *(P*= 0.001) at a significant level 0 .05. In addition, there was no significant difference on the effect of ages on knowledge level after the one-way analysis of variance was used. Public school teachers recorded (*p*=0.289) as compared to private school teachers (*p*=0.885). Similarly, there was no statically significance difference in relation to ages of the teachers and the practice of

infection prevention. Finally, public school teachers recorded (p =0.608) and (p=0.352) at a significant level of 0.05.

Table 6- *Educational Status of Teachers*

Teachers		Frequency	Percent	Valid Percent	Cumulative Percent
Public School Teachers	High school	8	10.0	10.0	10.0
	Cert A	8	10.0	10.0	20.0
	Diploma	46	57.5	57.5	77.5
	Degree	18	22.5	22.5	100.0
	Total	80	100.0	100.0	
Private School Teachers	High school	61	76.3	76.3	76.3
	Cert A	1	1.3	1.3	77.5
	Diploma	15	18.8	18.8	96.3
	Degree	1	1.3	1.3	97.5
	post graduate	2	2.5	2.5	100.0
	Total	80	100.0	100.0	

Table 7-*ANOVA* with *Multiple Comparisons (LSD)Test for knowledge level of School Teachers on Infection Prevention*

(I) educational status of teachers	(J) educational status of teachers	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
High school	Cert A	-.77778	5.94903	.896	12.5294	10.9739
	Diploma	-6.56831*	2.95003	.027	12.3958	-.7408
	Degree	-5.40351	4.34895	.216	13.9944	3.1874
	post graduate level	11.83333	12.04022	.327	11.9508	35.6174
	High school	6.56831*	2.95003	.027	.7408	12.3958
Diploma	Cert A	5.79053	5.99387	.336	-6.0497	17.6307
	Degree	1.16480	4.41010	.792	-7.5468	9.8764
	post graduate level	18.40164	12.06244	.129	-5.4263	42.2296

Table 6 represents the educational qualification of the teachers. The table reveals that a majority of public school teachers (representing 57.5%) were diploma holders, followed by degree holders (representing 22.5%) and the least qualification were teachers who were high school leavers (representing 10 %). Meanwhile, high school graduates accounted for 76.6% of the total population of private school teachers sampled for the study while Diploma holders accounted for 18.8%. The degree holders represented 1.3% sample of teachers. A one-way Analysis of Variance with post hoc test was conducted to explore the impact of educational status of teachers on knowledge level of infection prevention practice and the results showed a statically significance difference of (p=0.001). In spite of the significance difference, the actual difference in the mean scores between the groups was moderate as the eta value calculated was 0 .043. The post hoc comparison that was made using

LSD indicated a significant difference between high school level and diploma teachers. High school level teachers had a mean of 157.33 and a Standard Deviation of 17.82 while the diploma teachers scored a mean of 163.90 and a Standard Deviation of 15.99. Meanwhile, there was no statistically significance difference (p=0.378) when we use the same one-way Analysis of Variance to explore the impact of educational status of teachers on the practice of infection prevention.

Table 8- *Years of Working Experience as a Childcare Teacher*

Teachers (Years Of Experience)		Frequency	Percent	Valid Percent	Cumulative Percent
Public School Teachers	(0-5)years	39	48.8	48.8	48.8
	(6-10) years	14	17.5	17.5	66.3
	(11-15) years	12	15.0	15.0	81.3
	(16-20) years	5	6.3	6.3	87.5
	(21+) years	10	12.5	12.5	100.0
	Total	80	100.0	100.0	
Private School Teachers	(0-5)years	52	65.0	65.0	65.0
	(6-10) years	14	17.5	17.5	82.5
	(11-15) years	8	10.0	10.0	92.5
	(16-20)years	3	3.8	3.8	96.3
	(21+) years	3	3.8	3.8	100.0
	Total	80	100.0	100.0	

Table 9- *ANOVA Test for Effect of Working Experience of Teachers to Knowledge level and Practice on Infection Prevention*

		Sum of Squares	df	Mean Square	F	Sig.
Knowledge level of School teachers	Between Groups	424.528	4	106.132	.364	.834
	Within Groups	45240.972	155	291.877		
	Total	45665.500	159			
Practice of School teachers	Between Groups	82.149	4	20.537	.750	.559
	Within Groups	4244.626	155	27.385		
	Total	4326.775	159			

From Table 8, it is seen that teachers who had (0-5) years of experience in child care recorded 48.8% and were the majority in public childhood education centres. Equally, teachers in the private schools who had (0-5) years of experience in childcare also recorded 65% as the highest. On the other hand, the teachers in the public schools who had 21(12.5%) and above years of experience in childcare were more than the corresponding teachers in the private schools (3.8 %).

A one –way Analysis of Variance conducted to explore the impact of experience as a childcare teacher on knowledge and practice on infection prevention measures recorded (p=0.834) and (p=0.559) respectively, indicating no statistical significant difference.

Table 10- *Number of Children in the Class*

Teachers	Number of Children in a Class	Frequency	Percent	Valid Percent	Cumulative Percent
Public School Teachers	(0-20) children	9	11.3	11.3	11.3
	(21-30)children	27	33.8	33.8	45.0
	(31-40) children	21	26.3	26.3	71.3
	(41-50) children	12	15.0	15.0	86.3
	(51-60) children	9	11.3	11.3	97.5
	(61 and above) children	2	2.5	2.5	100.0
	Total	80	100.0	100.0	
Private School Teachers	(0-20) children	12	15.0	15.0	15.0
	(21-30)children	26	32.5	32.5	47.5
	(31-40) children	19	23.8	23.8	71.3
	(41-50) children	12	15.0	15.0	86.3
	(51-60) children	9	11.3	11.3	97.5
	(61 and above) children	2	2.5	2.5	100.0
	Total	80	100.0	100.0	

Table 11- ANOVA with post hoc Multiple Comparisons Tukey HSD Test for Number Of Children To Practice Of Teachers, Resource Availability and Barriers To Infection Prevention.

		Sum of Squares	df	Mean Square	F	Sig.
Practice of teachers	Between Groups	292.076	5	58.415	2.230	.049
	Within Groups	4034.699	154	26.199		
	Total	4326.775	159			
Resource availability	Between Groups	90.554	5	18.111	.509	.769
	Within Groups	5474.290	154	35.547		
	Total	5564.844	159			
Barriers to infection prevention	Between Groups	40.167	5	8.033	.753	.585
	Within Groups	1643.433	154	10.672		
	Total	1683.600	159			

	(J) number of children in a class	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
(41-50) children	(0-20) children	4.48214*	1.52945	.044	.0682	8.8960
	(21-30)children	2.73192	1.25935	.258	-.9025	6.3663
	(31-40) children	2.28333	1.32160	.516	-1.5307	6.0974
	(51-60) children	3.96825*	1.64411	.017	.7203	7.2162
	(61 and above) children	1.95833	2.76432	.981	-6.0193	9.9360

*. The mean difference is significant at the 0.05 level.

Statistically, the majority of school children enrolled within a class (21-30) of public childhood education centres accounted for 33.8% which was almost as the same as the majority of children enrolled in the private early childhood education centre with a percentage of 32.5%.

A one-way Analysis of Variance and a post hoc test conducted to explore the impact of the number of children within a class to the practice of teachers, resource availability and barriers to infection prevention practice indicated a significant difference (p= 0.49). There was also a moderate effect of eta value of 0.07 in relation to the practice of infection prevention and the number of children. A post hoc test, using Tukey HSD across the various groups of children in a class, showed significance difference across children within (41-50) and (51-60) group. Children within (41-50) recorded a SD= 4.7 and (p = 0.044) while children within the (51-60) group recorded SD=3.9 and (p=0.017). However, there was no statistically significance recorded for impact of the number of children and resource availability plus barriers to infection prevention. Statistical values recorded were (p=0.769), F - value of 0 .509 and (P=0.585), F - value 0.753, respectively.

Table 12a- *Knowledge Level of Infection Prevention and Control of Public School Teachers*

Statement	Likert Scale	Frequency	Percentage	Mean Score
The children we take care of in the school are possible source of infection to schoolchildren and the teachers.	Disagree	13	16.3	3.0750
	Strongly	2	2.5	
	Disagree	31	38.8	
	Agree	34	42.5	
	Strongly Agree	80	100.0	
	Total			
A child who is sick could be a source of infection to other children.	Disagree	6	7.5	3.3625
	Agree	33	41.3	
	Strongly Agree	41	51.3	
	Total	80	100.0	
A child infected with a disease can also spread the infections to family members and caregivers.	Disagree	1	1.3	3.5250
	Strongly	1	1.3	
	Disagree	33	41.3	
	Agree	45	56.3	
	Strongly Agree	80	100.0	
	Total			
These body fluids may also contain pathogens that can be a source of infections in the schools:				
Saliva	Disagree	4	5.0	3.1875
	Strongly	2	2.5	
	Disagree	49	61.3	
	Agree	25	31.3	
	Strongly Agree	80	100.0	
	Total			
Vomitus	Disagree	5	6.3	3.1625
	Strongly	4	5.0	
	Disagree	44	55.0	
	Agree	27	33.8	
	Strongly Agree	80	100.0	
	Total			
Faeces	Disagree	14	17.5	2.9375
	Strongly	2	2.5	
	Disagree	39	48.8	
	Agree	25	31.3	
	Strongly Agree	80	100.0	
	Total			
Blood	Disagree	7	8.8	3.2125
	Strongly	2	2.5	
	Disagree	38	47.5	
	Agree	33	41.3	
	Strongly Agree	80	100.0	

Total

Table 12b- *Knowledge Level of Infection Prevention and Control of Public School Teachers*

Statement	Likert scale	Frequency	Percentage	Mean Score
Mucus	Disagree	13	16.3	2.9375
	Strongly Disagree	3	3.8	
	Agree	40	50.0	
	Strongly Agree	24	30.0	
	Total	80	100.0	
The following are also possible source of infection in the school: Toys	Disagree	10	12.5	2.9000
	Strongly Disagree	5	6.3	
	Agree	48	60.0	
	Strongly Agree	17	21.3	
	Total	80	100.0	
Door Knobs	Disagree	7	8.8	3.0250
	Strongly Disagree	7	8.8	
	Agree	43	53.8	
	Strongly Agree	23	28.8	
	Total	80	100.0	
Water Closet Handles	Disagree	7	8.8	3.1625
	Strongly Disagree	3	3.8	
	Agree	40	50.0	
	Strongly Agree	30	37.5	
	Total	80	100.0	
Classroom Floors	Disagree	11	13.8	2.9375
	Strongly Disagree	6	7.5	
	Agree	40	50.0	
	Strongly Agree	23	28.8	
	Total	80	100.0	
A child putting contaminated toys in their mouth can transmit infection to other users.	Disagree	4	5.0	3.3625
	Strongly Disagree	2	2.5	
	Agree	35	43.8	
	Strongly Agree	39	48.8	
	Total	80	100.0	

Children who are in diapers may also transmit diarrheal infections to other children in the school through faecal contamination of teacher's hands, clothing, changing tables and leakage.	Disagree Strongly Disagree Agree Strongly Agree Total	10 7 37 26 80	12.5 8.8 46.3 32.5 100.0	2.9875

Table 12c- *Knowledge Level of Infection Prevention and Control of Public School Teachers*

Statement	**Likert scale**		**Percentage**	**Mean Score**
Very young children using the bathroom or toilet without supervision spread diarrhoea diseases	Disagree Strongly Disagree Agree Strongly Agree Total	9 5 31 35 80	11.3 6.3 38.8 43.8 100.0	3.1500
Four or more children in a class having similar diarrhoea symptoms at the same time might have an outbreak of diarrhoea diseases	Disagree Strongly Disagree Agree Strongly Agree Total	6 4 30 40 80	7.5 5.0 37.5 50.0 100.0	3.3000
An infected expressed breast milk given to a child could be a source of infection to the child	Disagree Strongly Disagree Agree Strongly Agree Total	2 3 34 41 80	2.5 3.8 42.5 51.3 100.0	3.4250
Respiratory diseases like tuberculosis and influenza are spread by droplets from sneezing or coughing which enters the respiratory tract through the nasal passages, or mouths of other children.	Strongly Disagree Disagree Agree Strongly Agree Total	2 2 29 47 80	2.5 2.5 36.3 58.8 100.0	3.513
Chicken pox and measles can spread in the air or by infected secretions on objects that are then handled by others	Disagree Strongly Disagree Agree Strongly Agree Total	4 3 25 48 80	5.0 3.8 31.3 60.0 100.0	3.4625
Contagious nasal secretions can also be passed directly to other children or through contact with contaminated surfaces.	Disagree Strongly Disagree Agree Strongly Agree Total	3 1 47 29 80	3.8 1.3 58.8 36.3 100.0	3.2750

Many children in a limited space facilitate transmission of infection.	Disagree	2	2.5	3.5625
	Agree	29	36.3	
	Strongly Agree	49	61.3	
	Total	80	100.0	
Close contact that occurs between children can promote skin diseases such as such as scabies, head lice and ring worm	Strongly	4	5.0	3.4875
	Disagree	33	41.3	
	Agree	43	53.8	
	Strongly Agree	80	100.0	
	Total			

Table 12d- Knowledge *Level of Infection Prevention and Control of Public School Teachers*

Statement	Likert scale	Frequency	Percentage	Mean Score
A child who is infected with a disease could have long term consequences.	Disagree	9	11.3	3.1125
	Strongly Disagree	1	1.3	
	Agree	42	52.5	
	Strongly Agree	28	35.0	
	Total	80	100.0	
A child who has measles or chicken pox should be managed at home until rash disappears.	Disagree	1	1.3	3.7125
	Strongly Disagree	1	1.3	
	Agree	18	22.5	
	Strongly Agree	60	75.0	
	Total	80	100.0	
Covering the mouth with a tissue when sneezing or coughing can prevent the spread of infections such as influenza and tuberculosis	Agree	25	31.3	3.6875
	Strongly Agree	55	68.8	
	Total	80	100.0	
Hand washing with soap and water protects children from diarrhoea and respiratory infections	Disagree	3	3.8	3.5000
	Agree	31	38.8	
	Strongly Agree	46	57.5	
	Total	80	100.0	
Alcohol-based hand sanitizer is as effective as soap and water when the hands are not visibly dirty Hand washing should be performed under the following circumstances;	Disagree	2	2.5	3.3250
	Agree	48	60.0	
	Strongly Agree	30	37.5	
	Total	80	100.0	
After cleaning nasal secretion of children	Agree	37	46.3	3.5375
	Strongly Agree	43	53.8	
	Total	80	100.0	
After diapering or toilet use.	Agree	30	37.5	3.6250
	Strongly Agree	50	62.5	

	Total	80	100.0	
Before feeding the children	Agree	25	31.3	3.6875
	Strongly Agree	55	68.8	
	Total	80	100.0	
Whenever hands are contaminated with blood or other bodily fluids such as faeces	Strongly Disagree	1	1.3	3.7000
	Agree	22	27.5	
	Strongly Agree	57	71.3	
	Total	80	100.0	

Table 12e- *Knowledge Level of Infection Prevention and Control of Public School Teachers*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean Score**
Before giving medications	Disagree	4	5.0	3.5125
	Agree	27	33.8	
	Strongly Agree	49	61.3	
	Total	80	100.0	
After giving medications	Disagree	7	8.8	3.1875
	Strongly Disagree	4	5.0	
	Agree	36	45.0	
	Strongly Agree	33	41.3	
	Total	80	100.0	
Before and after treating and bandaging a child with wound	Disagree	1	1.3	3.6500
	Agree	25	31.3	
	Strongly Agree	54	67.5	
	Total	80	100.0	
Household bleach (paraxone) is a better disinfectant than all other disinfectant	Disagree	38	47.5	2.1625
	Strongly Disagree	8	10.0	
	Agree	17	21.3	
	Strongly Agree	17	21.3	
	Total	80	100.0	
Cleaning urinals, bathroom facilities and toilet daily with bleach daily could prevent diseases in the school.	Disagree	5	6.3	3.3000
	Strongly Disagree	5	6.3	
	Agree	31	38.8	
	Strongly Agree	39	48.8	
	Total	80	100.0	
Diaper-changing surfaces should be disinfected after each change	Disagree	6	7.5	3.2000
	Strongly Disagree	4	5.0	
	Agree	38	47.5	
	Strongly Agree	32	40.0	
	Total	80	100.0	
All spillages of blood, faeces, and vomitus should be cleaned up immediately.	Disagree	1	1.3	3.7250
	Agree	19	23.8	
	Strongly Agree	60	75.0	
		80	100.0	

Every teacher employed in the school must do medical examination such as typhoid and tuberculosis test.	Disagree Strongly Disagree Agree Strongly Agree Total	18 4 29 29 80	22.5 5.0 36.3 36.3 100.0	2.8625
Every child who is admitted into the school must be up to date immunised regarding the childhood killer diseases.	Disagree Strongly Disagree Agree Strongly Agree Total	6 2 24 48 80	7.5 2.5 30.0 60.0 100.0	3.6750

Table 12f- *Knowledge Level of Infection Prevention and Control of Public School Teachers*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean Score**
Teachers should have service training on hygienic measures in other to take care of the children in the school	Agree Strongly Agree Total	26 54 80	32.5 67.5 100.0	3.4250
A teacher with fewer number of children have enough time to care for the children	Disagree Strongly Disagree Agree Strongly Agree Total	1 1 21 57 80	1.3 1.3 26.3 71.3 100.0	3.6750

Total Group Mean for Knowledge Level of Public School Teachers =3.303

Table 13a- *Knowledge Level of Infection Prevention and Control of Private School Teachers*

Statement	Likert Scale	Frequency	Percentage	Mean Score
The children we take care of in the school are possible source of infection to school children and the teachers	Disagree	12	15.0	2.8250
	Strongly Disagree	8	10.0	
	Agree	42	52.5	
	Strongly Agree	18	22.5	
	Total	80	100.0	
A child who is sick could be a source of infection to other children	Disagree	8	10.0	3.1875
	Strongly Disagree	2	2.5	
	Agree	37	46.3	
	Strongly Agree	33	41.3	
	Total	80	100.0	
A child who is infected with a disease can also spread the infections to family members and caregivers	Disagree	2	2.5	3.4625
	Strongly Disagree	2	2.5	
	Agree	33	41.3	
	Strongly Agree	43	53.8	
	Total	80	100.0	
A child who is sick from an infectious disease and comes to school can further spread the disease to other children.	Disagree	3	3.8	3.488
	Strongly Disagree	3	3.8	
	Agree	26	32.5	
	Strongly Agree	48	60.0	
	Total	80	100.0	
A child who has no symptoms of a disease may transmit infections to other children and family members.	Disagree	33	41.3	2.0625
	Strongly Disagree	20	25.0	
	Agree	16	20.0	
	Strongly Agree	11	13.8	
	Total	80	100.0	
These body fluids may also contain pathogens that can be a source of infections in				

the schools:

Saliva	Disagree	13	16.3	2.9250
	Strongly Disagree	1	1.3	
	Agree	45	56.3	
	Strongly Agree	21	26.3	
	Total	80	100.0	

Table 13: Knowledge Level of Injection Prevention and Control of Private School *Teachers*

Statement	Likert Scale	Frequency	Percentage	Mean Score
Vomitus	Disagree	10	12.5	3.0000
	Strongly Disagree	2	2.5	
	Agree	46	57.5	
	Strongly Agree	22	27.5	
	Total	80	100.0	
Urine	Disagree	17	21.3	2.7750
	Strongly Disagree	3	3.8	
	Agree	41	51.3	
	Strongly Agree	19	23.8	
	Total	80	100.0	
Faeces	Disagree	9	11.3	3.0250
	Strongly Disagree	1	1.3	
	Agree	49	61.3	
	Strongly Agree	21	26.3	
	Total	80	100.0	
Blood	Disagree	14	17.5	2.9125
	Strongly Disagree	3	3.8	
	Agree	39	48.8	
	Strongly Agree	24	30.0	
	Total	80	100.0	
Mucus	Disagree	14	17.5	2.7375
	Strongly Disagree	7	8.8	
	Agree	45	56.3	
	Strongly Agree	14	17.5	
	Total	80	100.0	

The following are also possible source of infection in the school: Toys	Disagree			
	Strongly Disagree	15	18.8	2.7750
	Agree	5	6.3	
	Strongly Agree	43	53.8	
	Total	17	21.3	
		80	100.0	
Door Knobs	Disagree	13	16.3	2.9000
	Strongly Disagree	4	5.0	
	Agree	41	51.3	
	Strongly Agree	22	27.5	
	Total	80	100.0	
Water Closet Handles	Disagree	9	11.3	3.0625
	Strongly Disagree	4	5.0	
	Agree	40	50.0	
	Strongly Agree	27	33.8	
	Total	80	100.0	

Table 13c- *Knowledge Level of Infection Prevention and Control of Private School Teachers*

Statement	**Likert Scale**	**Frequency**	**Percentage**	**Mean Score**
Classroom Floors	Disagree	16	20.0	2.7875
	Strongly Disagree	5	6.3	
	Agree	39	48.8	
	Strongly Agree	20	25.0	
	Total	80	100.0	
Children failing to wash their hands after visiting the toilet can be source of infection to other children	Disagree	5	6.3	3.4875
	Agree	26	32.5	
	Strongly Agree	49	61.3	
	Total	80	100.0	
Non washing of hands could be potential source of infection to the children we care	Disagree	1	1.3	3.3750
	Strongly Disagree	5	6.3	
	Agree	37	46.3	
	Strongly Agree	37	46.3	
	Total	80	100.0	
Children putting contaminated toys in their mouth can transmit infection to other users.	Disagree	10	12.5	3.1375
	Strongly Disagree	3	3.8	
	Agree	33	41.3	
	Strongly Agree	34	42.5	
	Total	80	100.0	
Children who are in diapers may also transmit diarrheal infections to other children in the school through faecal contamination of teacher's hands, clothing, changing	Disagree	5	6.3	3.1750
	Strongly Disagree	4	5.0	
	Agree	43	53.8	
	Strongly Agree	28	35.0	
	Total	80	100.0	

tables and leakage.

Very young children using the bathroom or toilet without supervision spread diarrhoea diseases	Disagree	11	13.8	2.9625
	Strongly Disagree	4	5.0	
	Agree	42	52.5	
	Strongly Agree	23	28.8	
	Total	80	100.0	

Table 13d- *Knowledge Level of Infection Prevention And Control Of Private School Teachers*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean Score**
Four or more children in a class having similar diarrhoea symptoms at the same time might have an outbreak of diarrhoea diseases.	Disagree	3	3.8	3.4500
	Strongly Disagree	1	1.3	
	Agree	33	41.3	
	Strongly Agree	43	53.8	
	Total	80	100.0	
An infected expressed breast milk given to a child could be a source of infection to the child.	Disagree	2	2.5	3.3875
	Strongly Disagree	4	5.0	
	Agree	35	43.8	
	Strongly Agree	39	48.8	
	Total	80	100.0	
A teacher who is infected with tuberculosis and is productive (producing phlegms) can easily transmit infection to the children and the staff in school.	Disagree	1	1.3	3.6625
	Strongly Disagree	25	31.3	
	Strongly Agree	54	67.5	
	Total	80	100.0	

Respiratory diseases like tuberculosis and influenza are spread by droplets from sneezing or coughing which enters the respiratory tract through the nasal passages, or mouths of other children.	Strongly Disagree Agree Strongly Agree Total	1 32 47 80	1.3 40.0 58.8 100.0	3.575
Chicken pox and measles can spread in the air or by infected secretions on objects that are then handled by others.	Disagree Strongly Disagree Agree Strongly Agree Total	7 1 32 40 80	8.8 1.3 40.0 50.0 100.0	3.3125

Table 13e- *Knowledge Level of infection prevention and control of Private School Teachers*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean Score**
Contagious nasal secretions can also be passed directly to other children or through contact with contaminated surfaces.	Disagree Strongly Disagree Agree Strongly Agree Total	9 1 46 24 80	11.3 1.3 57.5 30.0 100.0	3.0625
Many children in a limited space facilitate transmission of infection.	Disagree Strongly Disagree Agree Strongly Agree Total	5 31 44 80	6.3 38.8 55.0 100.0	3.4250
Close contact that occurs between children can promote skin diseases such as such as scabies, head lice and ring worm.	Disagree Strongly Disagree Agree Strongly Agree Total	3 1 32 44 80	3.8 1.3 40.0 55.0 100.0	3.4625

A child who is infected with a disease could have long-term consequences.	Disagree	17	21.3	2.8375
	Strongly Disagree	1	1.3	
	Agree	40	50.0	
	Strongly Agree	22	27.5	
	Total	80	100.0	
A child who has measles or chicken pox should be managed at home until rash disappears.	Disagree	1	1	3.6750
	Strongly Disagree	2	2	
	Agree	19	19	
	Strongly Agree	58	58	
	Total	80	80	
Covering the mouth with a tissue when sneezing or coughing can prevent the spread of infections such as influenza and tuberculosis.	Disagree	1	1.3	3.6000
	Strongly Disagree	1	1.3	
	Agree	27	33.8	
	Strongly Agree	51	63.7	
	Total	80	100.0	
Hand washing with soap and water protects children from diarrhoea and respiratory infections.	Disagree	1	1.3	3.5375
	Strongly Disagree	2	2.5	
	Agree	30	37.5	
	Strongly Agree	47	58.8	
	Total	80	100.0	

Table 13f-. *Knowledge Level of infection prevention and control of Private School Teachers*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean Score**
Alcohol-based hand sanitizer is as effective as soap and water when the hands are not visibly dirty.	Disagree	5	6.3	3.26
	Strongly Disagree	1	1.3	
	Agree	42	52.5	
	Strongly Agree	32	40.0	
	Total	80	100.0	
Hand washing should be performed under the following circumstances;				
After cleaning nasal secretion of children	Disagree	1	1.3	3.5000
	Agree	37	46.3	
	Strongly Agree	42	52.5	
	Total	80	100.0	
After diapering or toilet use.	Agree	26	32.5	3.6750
	Strongly Agree	54	67.5	
	Total	80	100.0	

Before feeding the children	Agree	33	41.3	3.5875
	Strongly Agree	47	58.8	
	Total	80	100.0	
Whenever hands are contaminated with blood or other bodily fluids such as faeces	Disagree	1	1.3	3.7125
	Agree	20	25.0	
	Strongly Agree	59	73.8	
	Total	80	100.0	
Before giving medications	Disagree	1	1.3	3.5000
	Strongly Disagree	1	1.3	
	Agree	35	43.8	
	Strongly Agree	43	53.8	
	Total	80	100.0	
After giving medications	Disagree	3	3.8	3.3250
	Strongly Disagree	45	56.3	
	Agree	32	40.0	
	Strongly Agree	80	100.0	

Table 13g- *Knowledge Level of infection prevention and control of Private School Teachers*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean Score**
Before and after treating and bandaging a child with wound	Disagree	1	1.3	3.6250
	Strongly Disagree	1	1.3	
	Agree	25	31.3	
	Strongly Agree	53	66.3	
	Total	80	100.0	
Cleaning urinals, bathroom facilities and toilet daily with bleach daily could prevent diseases in the school.	Disagree	2	2.5	3.4875
	Strongly Disagree	4	5.0	
	Agree	27	33.8	
	Strongly Agree	47	58.8	
	Total	80	100.0	
Diaper-changing surfaces should be disinfected after each change	Disagree	4	5.0	3.2875
	Strongly Disagree	2	2.5	
	Agree	41	51.2	
	Strongly Agree	33	41.3	
	Total	80	100.0	

All spillages of blood, faeces, and vomitus should be cleaned up immediately.	Strongly Disagree Agree Strongly Agree Total	1 24 55 80	1.3 30.0 68.8 100.0	3.6750
Every teacher employed in the school must do medical examination such as typhoid and tuberculosis test.	Disagree Strongly Disagree Agree Strongly Agree Total	7 3 35 35 80	8.8 3.8 43.8 43.8 100.0	3.2250
Every child admitted into the school must be up to date immunised regarding the childhood killer diseases.	Disagree Strongly Disagree Agree Strongly Agree	1 39 40 80	1.3 48.8 50.0 100.0	3.475

Table 13h- *Knowledge Level of infection prevention and control of Private School Teachers*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean Score**
Teachers should have service training on hygienic measures in other to take care of the children in the school.	Disagree Strongly Disagree Agree Strongly Agree	1 24 55 80	1.3 30.0 68.8 100.0	3.6750
A teacher with fewer numbers of children have enough time to care for the children.	Disagree Strongly Disagree Agree Strongly Agree Total	80 2 24 54 80	100.0 2.5 30.0 67.5 100.0	3.6250

Total Group Mean on Knowledge Level for Private School Teachers = 3.243

Table 14- *Classification of Knowledge Level*

Mean Rating	**Interpretation**
Below 2.00	Very poor knowledge
2.00 - 2.50	Poor knowledge
2.60 - 3.00	Fair Knowledge
3.10-3.50	Good knowledge
3.60 and above	Very good knowledge

Table 15- *Mann-Whitney U Test for Difference Between Knowledge Level of Public and Private School Teachers on Infection Prevention*

	Knowledge Level Of Teachers
Mann-Whitney U	2824.500
Wilcoxon W	6064.500
Z	*-1.282*
Asymp. Sig. (2-tailed)	.200

a. Grouping Variable: teachers

Statistically, as can be seen from Table 12, public school teachers from early childhood education centres scored group mean of 3.303 indicating that, they have a good knowledge on infection control measures. Similarly, teachers from private early childhood education centres have a good knowledge about infection control measures. The descriptive analysis is in accordance with an

Independent Mann Whitney U test which recorded (p =0.200) at a significance level of 0.05 and (z =-1.282) which indicate that the distribution of knowledge of infection prevention is the same across categories of teachers. Table 16 below presents the results on the practices of public school teachers in early childhood education centres concerning infection prevention.

Table 16a- *Practices of Public School Teachers in Early Childhood Education Centres Concerning Infection Prevention*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean**
When a child has runny nose, that child's nostrils is cleaned with clean disposable tissue	Never	1	1.3	2.6750
	Sometimes	24	30.0	
	Always	55	68.8	
	Total	80	100.0	
Hand hygiene is performed:	Never	19	23.8	2.1250
	Sometimes	44	55.0	
a. Upon arrival from home	Always	17	21.3	
	Total	80	100.0	
b. Before I eat	Sometimes	9	11.3	2.8875
	Always	71	88.8	
	Total	80	100.0	

c.	After I coughed/sneezed/ wiped my nose	Never Sometimes Always Total	3 30 47 80	3.8 37.5 58.8 100.0	2.5500
d.	After contact with urine, faeces and vomitus	Never Sometimes Always Total	1 11 68 80	1.3 13.8 85.0 100.0	2.8375

Table16b- *Practices of Public School Teachers in Early Childhood Education Centres Concerning Infection Prevention*

Statement		Likert scale	Frequency	Percentage	Mean
e.	After changing a diaper	Never Sometimes Always Total	3 13 64 80	3.8 16.3 80.0 100.0	2.7625
f.	After I assist children with toilet use/wiping buttocks	Never Sometimes Always Total	1 9 70 80	1 9 70 80	2.8625
g.	When my hands looks dirty	Never Sometimes Always Total	2 8 70 80	2.5 10.0 87.5 100.0	2.8500
h.	After the children have returned from break	Never Sometimes Always Total	13 43 24 80	16.3 53.8 30.0 100.0	2.4375
i.	Before giving	Never	6	7.5	2.5375

	medication	Sometimes	25	31.3	
		Always	49	61.3	
		Total	80	100.0	
j.	After giving medications	Never	8	10.0	2.3875
		Sometimes	33	41.3	
		Always	39	48.8	
		Total	80	100.0	
k.	Before and after treating and bandaging a child with wound.	Never	2	2.5	2.8125
		Sometimes	11	13.8	
		Always	67	83.8	
		Total	80	100.0	
A cake of soap is used in washing of hands by children and teachers		Never	11	13.8	2.4375
		Sometimes	23	28.7	
		Always	46	57.5	
		Total	80	100.0	

Table 16c- *Practices of Public School Teachers in Early Childhood Education Centres Concerning Infection Prevention*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean**
Children share communal towels after washing of hands	Never	29	36.3	1.9875
	Sometimes	23	28.7	
	Always	28	35.0	
	Total	80	100.0	
During eating time, children use spoons provided by the school to eat.	Never	35	43.8	1.9875
	Sometimes	11	13.8	
	Always	34	42.5	
	Total	80	100.0	
Children who come to the school without cups shares cups and water bottles with their friends.	Never	15	18.8	2.2375
	Sometimes	31	38.8	
	Always	34	42.5	
	Total	80	100.0	
After playing, toys used by children are washed with mild disinfectant.	Never	39	48.8	1.7125
	Sometimes	25	31.3	
	Always	16	20.0	
	Total	80	100.0	
When a child soils himself or herself, that	Never	12	15.0	2.6375
	Sometimes	5	6.3	

child is cleansed.	Always	63	78.8	
	Total	80	100.0	
When there is spillage of blood, vomitus and faeces in the classroom, the classroom floor is mopped immediately.	Never	1	1.3	2.9500
	Sometimes	2	2.5	
	Always	77	96.3	
	Total	80	100.0	
During cleaning of vomitus, faeces and blood, gloves are worn	Never	31	38.8	1.9125
	Sometimes	25	31.3	
	Always	24	30.0	
	Total	80	100.0	
Toilet seats in the schools are clean.	Never	6	7.5	2.4500
	Sometimes	32	40.0	
	Always	42	52.5	
	Total	80	100.0	

Table 16d- *Practices of Public School Teachers in Early Childhood Education Centres Concerning Infection Prevention*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean**
Water closets handles are clean	Never	14	17.5	2.2750
	Sometimes	30	37.5	
	Always	36	45.0	
	Total	80	100.0	
Teachers share toilets and urinals with the children	Never	51	63.7	1.5500
	Sometimes	14	17.5	
	Always	15	18.8	
	Total	80	100.0	
If a child vomits, urinates or soils the floor, a detergent is used to clean the floor.	Never	7	8.8	2.6500
	Sometimes	14	17.5	
	Always	59	73.8	
	Total	80	100.0	
Bleach (parazone) is used to clean the toilet	Never	13	16.3	2.2375
	Sometimes	35	43.8	
	Always	32	40.0	
	Total	80	100.0	
More than 28 children use one toilet facility	Never	8	10.0	2.6375
	Sometimes	13	16.3	
	Always	59	73.8	
	Total	80	100.0	

Children sleeping mats are cleaned and dried in the sun	Never	7	8.8	2.2750
	Sometimes	44	55.0	
	Always	29	36.3	
	Total	80	100.0	

Total Group Mean for Infection Practice for Public School Teachers =2.415

Table 17a- *Practices of Private School Teachers in Early Childhood Education Centres Concerning Infection Prevention*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean Score**
When a child has runny nose, that child's nostrils is cleaned with clean disposable tissue	Never	2	2.5	2.700
	Sometimes	20	25.0	
	Always	58	72.5	
	Total	80	100.0	
Hand hygiene is performed; Upon arrival from home	Never	20	25.0	1.975
	Sometimes	40	50.0	
	Always	20	25.0	
	Total	80	100.0	
Before I eat	Sometimes	3	3.8	2.962
	Always	77	96.3	
	Total	80	100.0	
After I coughed/sneezed/wiped my nose	Never	2	2.5	2.737
	Sometimes	17	21.3	
	Always	61	76.3	
	Total	80	100.0	
After contact with urine, faeces and vomitus	Sometimes	6	7.5	2.925
	Always	74	92.5	
	Total	80	100.0	

After changing a diaper	Never	2	2.5	2.862
	Sometimes	7	8.8	
	Always	71	88.8	
	Total	80	100.0	
After I assist children with toilet use/wiping buttocks	Never	1	1.3	2.950
	Sometimes	2	2.5	
	Always	77	96.3	
	Total	80	100.0	
When my hands looks dirty	Never	2	2.5	2.825
	Sometimes	10	12.5	
	Always	68	85.0	
	Total	80	100.0	
After the children have returned from break	Never	21	26.3	2.012
	Sometimes	37	46.3	
	Always	22	27.5	
	Total	80	100.0	

Table 17b- *Practices of Private School Teachers in Early Childhood Education Centres Concerning Infection Prevention*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean Score**
Before giving medication	Never	5	6.3	2.650
	Sometimes	18	22.5	
	Always	57	71.3	
	Total	80	100.0	
After giving medications	Never	8	10.0	2.562
	Sometimes	19	23.8	
	Always	53	66.3	
	Total	80	100.0	
Before and after treating and bandaging a child with wound.	Never	1	1.3	2.900
	Sometimes	6	7.5	
	Always	73	91.3	
	Total	80	100.0	
A cake of soap is used in washing of hands by children and teachers	Never	8	10.0	2.650
	Sometimes	12	15.0	
	Always	60	75.0	
	Total	80	100.0	
Children share communal towels after washing of hands	Never	30	37.5	1.987
	Sometimes	21	26.3	
	Always	29	36.3	
	Total	80	100.0	

During eating time, children use spoons provided by the school to eat.	Never Sometimes Always Total	49 10 21 80	61.3 12.5 26.3 100.0	1.650
Children who come to the school without cups shares cups and water bottles with their friends.	Never Sometimes Always Total	31 33 16 80	38.8 41.3 20.0 100.0	1.812
After playing, toys used by children are washed with mild disinfectant	Never Sometimes Always Total	28 34 18 80	35.0 42.5 22.5 100.0	1.875

Table 17c- *Practices of Private School Teachers in Early Childhood Education Centres Concerning Infection Prevention*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean Score**
When a child soils himself or herself, that child is cleansed.	Never Sometimes Always Total	3 3 74 80	3.8 3.8 92.5 100.0	2.887
When there is spillage of blood, vomitus and faeces in the classroom, the classroom floor is mopped immediately	Never Sometimes Always Total	3 5 72 80	3.8 6.3 90.0 100.0	2.862
During cleaning of vomitus, faeces and blood, gloves are worn	Never Sometimes Always Total	23 30 27 80	28.7 37.5 33.8 100.0	2.050
Toilet seats in the schools are clean.	Never Sometimes Always Total	7 34 39 80	8.8 42.5 48.8 100.0	2.400

Water closets handles are clean	Never	7	8.8	2.650
	Sometimes	14	17.5	
	Always	59	73.8	
	Total	80	100.0	
Teachers share toilets and urinals with the children	Never	57	71.3	1.475
	Sometimes	8	10.0	
	Always	15	18.8	
	Total	80	100.0	
If a child vomits, urinates or soils the floor, a detergent is used to clean the floor.	Never	3	3.8	2.812
	Sometimes	9	11.3	
	Always	68	85.0	
	Total	80	100.0	
Bleach (parazone) is used to clean the toilet	Never	12	15.0	2.462
	Sometimes	19	23.8	
	Always	49	61.3	
	Total	80	100.0	

Table 17d- *Practices of Private School Teachers in Early Childhood Education Centres Concerning Infection Prevention*

Statement	**Likert scale**	**Frequency**	**Percentage**	**Mean Score**
More than 28 children use one toilet facility	Never	14	17.5	2.462
	Sometimes	15	18.8	
	Always	51	63.7	
	Total	80	100.0	
Children sleeping mats are cleaned and dried in the sun	Never	2	2.5	2.287
	Sometimes	53	66.3	
	Always	25	31.3	
	Total	80	100.0	

Total Group Mean for Private School Teachers = 2.460

Table 18- *Classification of Practice of Infection Prevention*

Mean Rating	Interpretation
Below 2.00	Very Poor practise
2.00 - 2.50	Poor practise
2.60 - 3.00	Fairly good practise
3.10-3.50	Good practise
3.60 and Above	Very good practise

Table 19- *Mann-Whitney U Test for Difference in Practice Between Public and Private School Teachers on Infection Prevention*

Practice Score of school Teachers	
Mann-Whitney U	2959.500
Wilcoxon W	6199.500
Z	-.823
Asymp. Sig. (2-tailed)	.411

Table 20- *ANOVA* Test for *Impact of Knowledge Level of teachers on Infection Prevention Practice*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1476.592	58	25.458	.902	.662
Within Groups	2850.183	101	28.220		
Total	4326.775	159			

Public school teachers and private school teachers practiced poorly with respect to infection prevention and control measures even though they had good knowledge about infection prevention measures. Public school teachers recorded a mean value of 2.42 while public school teachers recorded a mean value of 2.46. A Mann-Whitney U test was conducted to explore the difference between the two categories of teachers recorded Mann-Whitney U

test value of 2959.500, Z=-.823 and (p=0.411). The findings implied that there was no statistical significance difference between the two categories of teachers. A one- way Analysis of Variance conducted to explore the impact of knowledge of teachers on practice of teachers showed no statistical significance difference (p=0 .662) and (f =0.902). Presented in Table 21 is a practice of public and private School teachers on diapering and bottle-feeding activities:

Table 21- *Practice of public and private School teachers on diapering and bottle-feeding activities*

Statements	Likert scale	F(x)for public teacher	F(x) for private teachers	% for public teachers	% for private teachers	Mode for public teachers	Mode for private teachers
Children who are bottled fed have their Names labelled on their prospective bottles.	Never	7	19	8.8	23.8	9.00	2.00
	sometimes	18	29	22.5	36.3		
	always	12	27	15.0	33.8		
	activity not applicable	43	5	53.8	6.3		
	Total	80	80	100.0	100.0		
When a child's diapers are changed, the area where the changing took place is cleaned with a disinfectant.	Never	7	10	8.8	12.5	9.00	2.00
	sometimes	19	40	23.8	50.0		
	always	11	27	13.8	33.8		
	activity not applicable	43	3	53.8	3.8		
	Total	80	80	100.0	100.0		
After changing a diaper of a child, the used diaper is wrapped in a leak-proof bag (polythene	Never	15	27	18.8	33.8	9.00	2.00
	sometimes	18	33	22.5	41.3		
	always	4	20	5.0	25.0		
	activity not applicable	43	---	53.8	----		
	Total	80	80	100.0	100.0		

Descriptively, 53.8% of public School teachers responded that certain activities such as feeding Infants from expressed breast milk kept in baby bottles, diapering activities was not applicable to the public childhood education centres because children aged 4 years and 5 years are admitted. However, few public childhood education centres admits babies and infants. With respect to private childhood centres, teachers recorded a mode of 2 with respect infants labelling of bottles of infants on expressed breast milk as well as diapering activities.

Table 22a- *Availability of Resources for Infection Control in Public Early Childhood Education Centr*es

Statements	**Likert Scale**	**Frequency**	**Percentage**	**Mean Score**
Running water is available for children and teachers to use in washing of hands	Never	5	6.3	2.7125
	Sometimes	13	16.3	
	Always	62	77.5	
	Total	80	100.0	
Source of water for washing of hands are available in basins	Never	21	26.3	2.2875
	Sometimes	15	18.8	
	Always	44	55.0	
	Total	80	100.0	
Functioning Washing sink is available in every classroom	Never	80	100.0	1.0000
	Total			
liquid soap in a dispenser is available for use during hand washing	Never	27	33.8	2.0750
	Sometimes	20	25.0	
	Always	33	41.3	
	Total	80	100.0	
Alcohol based sanitizer is readily available for teachers and children for use during hand washing	Never	36	45.0	1.7250
	Sometimes	30	37.5	
	Always	14	17.5	
	Total	80	100.0	

Table 22b- *Availability of Resources for Infection Control in Public Early Childhood Education Centres*

Statements	Likert Scale	Frequency	Percentage	Mean Score
Disposable tissues are available for wiping of hands after hand washing	Never	45	56.3	1.6375
	Sometimes	19	23.8	
	Always	16	20.0	
	Total	80	100.0	
Fabric towels are available for wiping hands after washing	Never	28	35.0	1.9875
	Sometimes	25	31.3	
	Always	27	33.8	
	Total	80	100.0	
Disposable tissues available for cleaning mucous nostrils of children	Never	26	32.5	2.1750
	Sometimes	14	17.5	
	Always	40	50.0	
	Total	80	100.0	
Different mops are available for cleaning the school kitchen, classroom floor and the toilet.	Never	2	2.5	1.8625
	Sometimes	7	8.8	
	Always	71	88.8	
	Total	80	100.0	
More than one teacher is available in a classroom.	Never	24	30.0	2.0875
	Sometimes	25	31.3	
	Always	31	38.8	
	Total	80	100.0	
Available toilet for schoolchildren and teachers to use.	Never	19	23.8	2.2500
	Sometimes	22	27.5	
	Always	39	48.8	
	Total	80	100.0	
Bleach is available for cleaning the toilet, bathroom and urinal.	Never	11	13.8	2.40000
	Sometimes	26	32.5	
	Always	43	53.8	
	Total	80	100.0	
All Classroom windows have mosquito proof net available	Never	70	87.5	1.2125
	Sometimes	3	3.8	
	Always	7	8.8	
	Total	80	100.0	
Dustbins in every class with well-covered lid are available for rubbish collection.	Never	18	22.5	2.2250
	Sometimes	26	32.5	
	Always	36	45.0	
	Total	80	100.0	

*Table 22c- Availability of Resources for Infection Control in Public Early Childhood Education Centr***es**

Statements	Likert Scale	Frequency	Percentage	Mean Score
Clean drinking water is available for the children	Never	5	6.2	2.7375
	Sometimes	11	13.8	
	Always	64	80.0	
	Total	80	100.0	
Good ventilation available	Never	2	2.5	2.8625
	Sometimes	7	8.8	
	Always	71	88.8	
	Total	80	100.0	

Group mean of responses from teachers in public childhood education centres=2.176

Table 23a- *Availability of Resources for Infection Control in Public Early Childhood Education Centres*

Statements	Likert Scale	Frequency	Percentage	Mean Score
Running water is available for children and teachers to use in washing of hands	Never	5	6.3	2.6875
	Sometimes	15	18.8	
	Always	60	75.0	
	Total	80	100.0	
Source of water for washing of hands are available in basins	Never	15	18.8	2.5125
	Sometimes	9	11.3	
	Always	56	70.0	
	Total	80	100.0	
Functioning Washing sink is available in every classroom	Never	80	100	1.0000
	Total			
liquid soap in a dispenser is available for use during hand washing	Never	15	18.8	2.3625
	Sometimes	21	26.3	
	Always	44	55.0	
	Total	80	100.0	
Alcohol based sanitizer is readily available for teachers and children for use during hand washing	Never	37	46.3	1.8125
	Sometimes	21	26.3	
	Always	22	27.5	
	Total	80	100.0	

Table 23b- *Availability of Resources for Infection Control in Public Early Childhood Education Centres*

Statements	Likert Scale	Frequency	Percentage	Mean Score
Disposable tissues are available for wiping of hands after hand washing	Never	33	41.3	1.9875
	Sometimes	15	18.8	
	Always	32	40.0	
	Total	80	100.0	
Fabric towels are available for wiping hands after washing	Never	17	21.3	2.3750
	Sometimes	16	20.0	
	Always	47	58.8	
	Total	80	100.0	
Disposable tissues available for cleaning mucous nostrils of children	Never	5	6.3	2.5750
	Sometimes	24	30.0	
	Always	51	63.8	
	Total	80	100.0	
Different mops are available for cleaning the school kitchen, classroom floor and the toilet	Never	18	22.5	2.3375
	Sometimes	17	21.3	
	Always	45	56.3	
	Total	80	100.0	
More than one teacher is available in a classroom.	Never	22	27.5	2.2250
	Sometimes	18	22.5	
	Always	40	50.0	
	Total	80	100.0	
Available toilet for school children and teachers to use	Never	7	8.8	2.5750
	Sometimes	20	25.0	
	Always	53	66.3	
	Total	80	100.0	
Bleach is available for cleaning the toilet, bathroom and urinal	Never	2	2.5	2.75000
	Sometimes	16	20.0	
	Always	62	77.5	
	Total	80	100.0	
All Classroom windows have mosquito proof net available	Never	49	61.3	1.7000
	Sometimes	6	7.5	
	Always	25	31.3	
	Total	80	100.0	
Dustbins in every class with well-covered lid are available for rubbish collection.	Never	18	22.5	2.3750
	Sometimes	14	17.5	
	Always	48	60.0	
	Total	80	100.0	

Table 23c- *Availability of Resources for Infection Control in Public Early Childhood Education Centres*

Statements	**Likert Scale**	**Frequency**	**Percentage**	**Mean Score**
Clean drinking water is available for the children	Never	1	1.3	2.9125
	Sometimes	5	6.3	
	Always	74	92.5	
	Total	80	100.0	
Good ventilation available	Never	3	3.8	2.7500
	Sometimes	14	17.5	
	Always	63	78.8	
	Total	80	100.0	

Group mean of responses from teachers in private childhood education centres=2.445

Table 24- *Resource Availability on Diaper Changing Area for Public and Private Early Childhood Education Centres*

Statements	Likert scale	F for public teacher	F for private teachers	% for public teachers	% for private teachers	Mode score for public teachers	Mode score for private teachers
Designated area available for changing of diaper	Never	17	37	21.3	46.3	4.00	1.00
	sometimes	10	13	12.5	16.3		
	always	10	30	12.5	37.5		
	activity not applicable	43	---	53.8	----		
	Total	80	80	100.0	100.0		

Table 25- *Classification of Resources Availability*

Mean Rating	**Interpretation**
Less than 2.00	Non availability of resources
2.00------2.50	Inadequate resources
2.60------3.00	Moderate availability resources
3.10------3.50	Adequate resources
Above 3.60	Over resourced

Table 26- *Independent Samples Test for Resource Availability*

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.017	.896	-4.938	158	.000	-4.31250	.87339	-6.03752	-2.58748
Equal variances not assumed			-4.938	156.375	.000	-4.31250	.87339	-6.03766	-2.58734

Table 27- *ANOVA Test for Impact of Resource Availability on the Practice of Infection Prevention*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1292.559	23	56.198	1.789	.022
Within Groups	4272.285	136	31.414		
Total	5564.844	159			

Descriptively, both the public and private educational centres had inadequate resources with respect in to infection prevention. Public childhood centres recorded a mean value of 2.077 while private childhood education centres recorded a mean value of 2.308. A one-way T- test analysis was conducted to compare resources availability for public and private school teachers. The results showed a statistical significant difference in scores for public teachers (M=34.813, SD=5.799) and private teachers (M=39.125, SD=5.235); T (158) = -4.938, p=0.001 (2-tailed). The magnitude of the difference was a large (eta squared 0.134). This is an indication that Private school teachers' resource availability for infection prevention measures is more than that of the public school teachers. Similarly, there was a significance difference (p=0.022) and f=1.789 after one-way ANOVA was used to explore the impact of resource availability on the practice of infection prevention by the teachers.

Table 28- *Large Number of Children as a Barrier to Hand Washing*

Statements	Likert Scale	F(x) for public teachers	% For public teachers	F(x) For private teachers	% For private teachers	Mean Score of public teachers	Mean score of private teachers
I am not able to wash the children's hands always because, the children are many	Disagree	13	16.3	17	21.3	2.5500	2.3000
	Strongly	28	35.0	34	42.5		
	Disagree	21	26.3	17	21.3		
	Agree	18	22.5	12	15.0		
	Strongly Agree	80	100.0	80	100.0		
	Total						

Table 29- *Lack of Time as a Barrier to Hand Washing*

Statements	Likert Scale	F(x) For public teachers	% For public teachers	F(x) For private teachers	% For private teachers	Mean Score of public teachers	Mean score of private teachers
I am not able to wash the children's hands after playing because I don't have time.	Disagree	18	22.5	23	28.8	2.3125	2.1375
	Strongly Disagree	28	35.0	34	42.5		
	Agree	25	31.3	12	15.0		
	Strongly Agree	9	11.3	11	13.8		
	Total	80	100.0	80	100.0		

Table 30- *Few Staff as a Barrier in Mopping the Classroom*

Statements	Likert Scale	F(x) For public teachers	% For public teachers	F(x) For private teachers	% For private teachers	Mean Score of public teachers	Mean score of private teachers
Classroom is not mopped frequently because, there is fewer staff	Disagree	29	36.3	26	32.5	2.0000	1.9125
	Strongly	27	33.8	39	48.8		
	Disagree	19	23.8	11	13.8		
	Agree	5	6.3	4	5.0		
	Strongly Agree	80	100.0	80	100.0		
	Total						

Table 31- *Inadequate Funds to Buy Hand Hygiene Products*

Statements	Likert Scale	F(x) For public teachers	% For public teachers	F(x) For private teachers	% For private teachers	Mean score of public teachers	Mean score of private teachers
The children do not wash their hands, because there is not enough money in the school to buy hand hygiene products such as towels, liquid soap and alcohol hand rub	Disagree	24	30.0	25	31.3	2.0875	1.8500
	Strongly	33	41.3	47	58.8		
	Disagree	15	18.8	3	3.8		
	Agree	8	10.0	5	6.3		
	Strongly Agree	80	100.0	80	100.0		
	Total						

Table 32- *Washing Items Locked in Offices*

Statements	Likert Scale	F(x) For public teachers	% For public teachers	F(x) For private teachers	% For private teachers	Mean Score of public teachers	Mean score of private teachers
The children and I do not wash our hands because the washing items are locked in the offices	Disagree	22	27.5	20	25.0	1.9000	1.8500
	Strongly	49	61.3	55	68.8		
	Disagree	4	5.0	2	2.5		
	Agree	5	6.3	3	3.8		
	Strongly Agree	80	100.0	80	100.0		
	Total						

Table 33- *Unnecessary To Wash Hands*

Statements	Likert Scale	F(x) For public teachers	% For public teachers	F(x) For private teachers	% For private teachers	Mean Score of public teachers	Mean score of private teachers
I do not wash my hands always, because I think, it is not necessary.	Disagree	20	25.0	21	26.3	1.8750	1.8250
	Strongly	53	66.3	54	67.5		
	Disagree	4	5.0	3	3.8		
	Agree	3	3.8	2	2.5		
	Strongly Agree	80	100.0	80	100.0		
	Total						

Discussion

The present study shows that female teachers were the majority of teachers in the public (96.3%) as well as private schools (90%) in childhood education centres. Statistically, the data showed that there was no significant difference on the impact of knowledge on gender (p=0.293). On the other hand, there was a statistically significant difference on the impact of gender of teachers to the practice of infection prevention (p=0.033). This means that the distribution of knowledge level of infection prevention is the same across the female and male teachers but the practice of infection prevention differs. According to Anliaka and Beyazkurk (2008), while in some professions, the gender balance seems to be changing in the direction of equality, the participation of males in early childhood education has not expanded because of stereotypical perceptions of this occupation as "women's work and fear of being accused of sexual abuse. Johnson (2008) also points out that while on the job, men experience undue pressures to avoid physical contact or to be alone with young children for fear of a perceived impropriety discourage male teachers from teaching younger children.

Practically, most parents may not feel comfortable for male teachers to handle children below 2 years especially, when it comes to issues of changing diapers as well as washing down younger children when they the soil themselves with faeces and urine. Proprietors therefore take into considerations such as the issues of child abuse and religious issues when employing male teachers even though males make important contributions to the field of early childhood education as well as female teachers.

Descriptive analysis showed that 52.5% representing a majority of the teachers in the public childhood education centres were 45 years and above with the least ages (18- 24) years representing 3.8% while the private childhood education centres had a majority of the teachers (representing 40%) aged between (18-24) years. With respect to the educational status of teachers, it was found that a majority of private school teachers (76%) recruited were senior high school leavers and that accounts for the high number of private teachers in the age range of 18- 24 years. In addition, there was no significant difference on the effect of ages on knowledge level. Public school teachers recorded (p=0.289) as compared to private school teachers which had (p=0.885). Similarly, there was no statistically significance difference in relation to ages of the teachers and the practice of infection prevention. Public school teachers had (p =0.608) and (p=0.352) at significant level of 0.05. This is an indication that ages of teachers in early childhood education centres do not have any corresponding effect on the knowledge of infection prevention and the practice of infection prevention, though one would argue that teachers above 45 years are more tolerant and experienced in childcare practices.

Eliason and Jenkins (2008) share the opinion that early childhood education is not an easy task for teachers because it needs 'well-trained, committed staff', that would ensure the provision of a rich curriculum and adequate resources. Eliason and Jenkins (2008) went further to stress the view that, 'Teaching in early childhood is a complex task and requires teachers with positive teaching strengths and qualities, as well as excellent teacher preparation and practice'. Qualified teachers have a significant impact on the

quality of learning and teaching (Kane, 2005). Although the level of benchmark qualifications and proportion of qualified staff in early childhood centres varies from country to country (Dalli et al., 2010). Tarr (2006) states the notions of what a teacher knows (knowledge), shows (attitudes) and does (skills) have an impact on the learners they work with. Similarly, Sammons (2010) indicated that well-resourced early childhood services with higher numbers of qualified teachers provide the highest quality of education and care, and the children attending these childhood centres make better progress.

The study presents that, a majority of public school teachers (representing 57.5%) were diploma holders followed by degree holders (representing 22.5%) and those with the least qualification (of 10 %) were high school leavers. Meanwhile, high school graduates accounted for 76.6% of the total population of private school teachers sampled for the study while Diploma holders accounted for 18.8% and Degree holders represented 1.3% of teachers sampled. Again, it was found that most of the private childhood education centres do not conform to the Ghana Education Service's requirement on educational status in that, per the requirement, a teacher must have a Cert A as the minimum qualification to be a childcare teacher. Again, for the GES, by the year 2010, every teacher must attained diploma before teaching in a childcare unit.

Statistically, there was significant difference of (p=0.001) when the impact of educational status of teachers on knowledge level of infection prevention was explored. In spite of the significance difference, the actual difference in the mean scores between the high school leavers and the diploma holders was moderate as eta value calculated was 0 .043. In the same way, there was no

statistical significance difference recorded when the impact of educational status of teachers on the practice of infection and control was explored (*P*= 0.378). The results of the findings indicate that diploma holders were more knowledgeable in infection practise probably due to the academic content used in the training the diploma teachers as compared to the high school leavers. Rovers (2008) is therefore of the view that a less-educated staff member might pay less attention to children changing beds or putting toys in their mouth, as teachers might be less aware of potential transmission paths. In addition, a less educated teacher might be less responsive to extra care.

Currently, the Ghana Education Service requires a maximum number of children in a class to be 25. It is therefore alarming when almost 30% samples of classes within the public sector and private sector have children over 40 within the class and sometimes with only one teacher to take care of them. One would argue that, the quality of care given to these children is compromise. DeSchipperet et al. (2006) identified that the strongest and most consistent predictor of observed positive caregiving in group-based early childhood settings is the adult: child ratio. That is, caregivers provided more sensitive, frequent and positive care when they were responsible for fewer children. Bedford and Sutherland (2008) have also drawn attention to the need to consider the effect those elements of the physical environment of early childhood settings, as crowded settings can have on the health of infants and toddlers, such as ear infections stomach flus and other childhood illnesses. Bedford and Sutherland (2008) study in accordance to the study of Greenberg, Hoffman, Leibovitz and Dagan (2008), that the development and spread of resistant organisms in day care centres are facilitated by large numbers of

children and frequent close person-to-person contact. Consequently, the spread of skin rashes like ringworm and scabies due to frequent contact are associated with large of children within a class. Large numbers of children within a classroom of poor ventilation are also at risk of respiratory conditions such as frequent colds and influenza that could also lead to unnecessary prescription of antibiotics to schoolchildren. Bradley & Vandell (2007) also discuss works interested in relating day care and communicable illnesses, such as diarrheal illness, otitis media, and respiratory infections. Their study showed that researchers often identify correlations between large number of children in day care centre and children's likelihood of suffering from infectious illnesses because larger groups (group size) consist of more potential infectious agents (Rovers, 2008).

Knowledge Level Teachers in Early childhood Education Centres

The results of the study revealed that the distribution of knowledge on infection prevention was the same across categories of teachers (public and private School teachers) where (p=0.200) at significant level of 0.05. Public teachers and private school teachers in general had a good knowledge level about infection prevention. Teachers in early childhood centres believed that the school children being handled by them could be a possible source of infection to them, which is in accordance with a statement made by HPA (2006). For example, pregnant childhood educators and their unborn babies are the ones who are at greater risk from contracting diseases such as cytomegalous and Parvovirus which are mediated through contact with infant saliva and urine exposure mainly associated with caring for young infants during diapering procedures (Stelma, Smismans, Goossens, Bruggeman &

Hoebe, 2009). Subsequently, the teachers could also be a source of infection to the children and the staff in the schools, which is evident in respiratory cases such as influenza and common colds. A teacher who is infected with cold and who sneezes directly into the classroom without covering the nose or perform appropriate hand washing practices share microorganism among children and staff members. They also believed that an infected child could spread the infection to family members and consequently spread the infection to colleagues at school if allowed to come to school. However, both categories of teachers had poor knowledge about the fact that infected children from infectious diseases who did not show symptoms could be a source of infection to staff and colleague children.

Their knowledge on the source of infection in the schools indicated that, public and private school teachers had a good knowledge about bodily fluids such as saliva, vomitus, urine and faeces from children they handle could contain pathogens that could be a possible source of infection in the school. Meanwhile, both categories of teachers scored a mean value of 2.9125 and 2.7375 respectively, indicating a fair knowledge that urine and mucus were bodily fluids that could be infected with pathogens. Similarly, they had a fair knowledge that toys, water closet handles /seats, door handles and classroom floors could also be a source of infection in the school. In addition, infected expressed breast milk given to a child could be a source of infection to the child.

Their knowledge on gastrointestinal diseases was not to be underrated, because the teachers knew that children who are in diapers could transmit diarrheal infections to other children in the school through faecal

contamination of teacher's hands, clothing, and changing places and from feacal leakage. In the same way, very young children using the bathroom or toilet without supervision, spread diarrhoea diseases and when four or more children in a class have similar diarrhoea, symptoms at the same time might be an indication an outbreak of diarrhoea diseases.

In relation to hand hygiene, the findings of the study corroborates with the findings of Rosen et al. (2009) on the intervention program and cluster randomised trial on 80 preschool educators and 40 preschools of age range 3-4 years. According to them, the knowledge of pre-teachers on hygiene was not to be underestimated. Educators believe that hand washing affects health and are important in disease control. This is because they work in an environment where there is the centrality of transmission of communicable disease in the community, and as such, play a crucial role in the battle against these diseases, through the enforcement of handwashing regulations among themselves and the children they teach. The teachers understood that children and teachers failing to wash their hands after visiting the toilet could be a source of infection to other children and teachers; therefore, hand washing with soap and water is required to protect children from diarrhoea and respiratory infections. Vivas et al. (2010) also support the use of soap and water. According to them, hand washing with soap reduces diarrhoea morbidity by 44% among school children. In addition, HWWS has been shown by various studies to reduce absenteeism from school due to illness (Bowen et al., 2007; Lau et al., 2012). Children absenteeism caused by gastrointestinal and respiratory-related illnesses can drop between 25% and 50%, if hand hygiene is improved (UNICEF, 2012). They also understood that hand washing was to be

performed in the following circumstances: after cleaning nasal secretion of children, after diapering or toilet use, before feeding the children, whenever hands were contaminated with blood or other bodily fluids such as faeces, before giving medications, after giving medications, and before and after treating a wound of a child (AAP, 2011).

Further findings showed that the teachers believed that alcohol-based hand sanitizer is as effective as soap and water when the hands are not visibly dirty. Correa et al. (2012) found out that, gastrointestinal diseases were reduced by 30%. The study was conducted in 42 childcare centres including preschools where there was a sporadic limited availability of water, non-functioning sink and a maximum population of 30 children in class. Scott et al. (2007) also found out that the use of alcohol hand rub was cheaper to that of soap dispenser, perceived convenience and satisfaction among teachers of the childhood centre.

Both categories of teachers (public and private school teachers) believed that respiratory diseases like tuberculosis and influenza are spread by droplets from sneezing or coughing which enters the respiratory tract through the nasal passages, or mouths of other children. In the same way, they exhibited good knowledge that a teacher who is infected with tuberculosis and is productive (producing phlegms) can easily transmit infection to the children and the staff in school. The teachers therefore agreed that every teacher who is employed in the school must undergo a medical examination such as typhoid and tuberculosis test. Performing a tuberculosis test by teachers before employment with subsequent TB screening as determined by history of high risk for TB thereafter in early childhood education centres is crucial. . Studies

have shown that their teachers have infected schoolchildren with tuberculosis. Even in low incidence countries like Italy where prevalence is low, 62 schoolchildren in a kindergarten were infected with tuberculosis (Filia, Ciarrocchi, Belfiglio, Caferri, Bella, Piersimoni, Cirillo, Grilli, Mancini, & Greco, 2011). In the same way, 35 children in a Swedish day-care centre were also infected with Tuberculosis (Gillman, Berggren, Bergstrom, Wahlgren & Bennet, 2008).

In Ghana, the high prevalence of tuberculosis among individuals' calls for Ghana Education Service and Ministry of Health to mandatory allows teachers and other staff of childhood centres to undergo tuberculin testing before employment, since it is evident that most schoolchildren have tested positive to the tuberculin bacilli (Addo et al, 2008). The survey of tuberculin testing in 21 districts of 8 regions in Ghana found out that 92.6% of 23,600 school children tested positive to tuberculosis which is an indication that the rate of infection of tuberculosis among school children is high.

In order to prevent infections to the children and staff in the school, the teachers understood that covering the mouth with a tissue when sneezing or coughing could prevent the spread of infections such as influenza and tuberculosis. Secondly, hand washing with soap and water protects children from diarrhoea and respiratory infections just as cleaning urinals, bathroom facilities and toilets daily with bleach could prevent diseases in the school. Furthermore, diaper-changing surfaces should be disinfected after each change as well as spillages of blood, faeces, and vomitus be cleaned up immediately.

Several studies have shown that health education on infection prevention practices such as handwashing had yielded a significant decrease of diseases

such diarrhoea episodes, Bronson-Lowe (2006) combined an environmental hygiene program with education in an intervention study at a preschool. They found that the combination generated significant decreases in total illness per child per month, median number of physician visits, courses of antibiotics administered, and days of school missed due to respiratory illness respiratory conditions leading to a decrease number of absenteeism in children and staff caused by diseases. Similarly, Rosen et al. (2007), in their observational interventional study, propose that preschool educators should have two-3-hour training sessions for the staff pediatricians and epidemiologist. The outcome of the study showed that even though educators in the control group were knowledgeable on hand hygiene, the intervention group scored better than the control group on five out of six items. The score for the knowledge scale was 6.24 for the intervention group (SD = 0.73) and 5.81 for the control group (SD = 0.79). Teachers were therefore to organise in-service training on hygienic measures in order to take care of the children in the school. Lastly, every child who gains admission into the school must be up to date immunised regarding the childhood killer diseases (Health Protection Scotland, 2011).

Practices of Teachers and Availability of Resources in Early Childhood Educational Centres

The results of the study showed that public school teachers and private school teachers practiced poorly with respect to infection prevention and control measures even though they had good knowledge about infection prevention measures. Public school teachers recorded a mean value of 2.42 while private school teachers recorded a mean value of 2.46 and there was no statistically significant difference between the two categories of teachers

(*P*=0.411). This means that the distribution of practice of infection prevention is the same between the two categorises of teachers. However, there was a statistical significant difference in scores for public teachers and private teachers *p*=0.001(2-tailed) and with a large effect of magnitude for the difference with reference to resource availability. This is an indication that resource availability to private school teachers on infection prevention practice is more than that of the public school teachers even though the availability of resources was inadequate in the municipality. Similarly, there was a significance difference (*p*=0.022) when the impact of resource availability on the practice of infection prevention by the teachers was explored.

Indication for hand hygiene practices by both public and private teachers was fairly good. An average number of teachers responded to practice hand hygiene; before they eat, after handling bodily fluids such as urine, vomitus, before and after treating a child with wound and after diaper change. Meanwhile, the most important practice of hand hygiene on the part of teachers, when they return home or after the children had returned from break was practiced poorly. The study further revealed that both staff members and children had the tendency to harbour harmful microorganism from the outside environment (such as dirt from public transport). The findings of the study is similar to those of Zomer et al. (2013) who surveyed 122 day care centr and 350 caregivers and found that although hand hygiene (HH) has proven to be an effective measure to prevent infections, its compliance was generally low. Also, Schmidt et al. (2009) in a pilot study in East London, pointed out that hand hygiene intervention is feasible and accepted by teachers in childcare centres in temporal situation especially in public health treat such as the HINI

influenza. The statement is true to some extent; for instance, during the Ebola pandemic in West Africa and during the cholera outbreaks in the country, public institutions, including early childhood centres, intensified hand hygiene practice.

Serra (2014) in her study recommends, just as the Health Protection Agency (2010) recommended that both members of staff and children wash their hands with liquid soap and running water, dry their hands using disposable paper towels, or use alcohol gel hand sanitizer (only if no water is available or after washing their hands with water). The availability of liquid soap in a dispenser to be used during hand washing was also found inadequate for the two categories of teachers in the municipality. Instead, 69 % of public teachers and 90% of the private school teachers and children used cakes of soap in washing of hands. Disposable tissues were not available for wiping one's hand after washing; neither were fabric towels. The schoolchildren consequently shared communal towels after washing of hands. In addition, alcohol-based sanitizer was not readily available for teachers and children for use during hand washing. The findings of the study is in accordance with Zomer, Erasmus, van Beeck, Richardus and Voeten (2013) who conducted an observational study on hand hygiene determinants and found that hand hygiene compliances cannot be effective without, number of sinks, type of towel soap facilities and availability of alcohol-based hand sanitizers. Their observational study on the compliance to hand hygiene further revealed that the type of towel facilities was significantly associated with hand hygiene**.** The study concluded that education alone is insufficient to change behaviour; however, other provisional enabling factors such (soap, soap dispensers, paper

towels, paper towel dispensers and individual cups) must augment change of behaviour.

Furthermore, a survey on availability of functional sinks in the classroom showed that none of the schools in the public as well private had a functional sink in the classroom; however, running water from veronica buckets was available for children and teachers in some schools for use in washing of hands. Though CDC (2007) regards the use of shared basins for hand washing as inadequate in ridding the hands of pathogens, the response of 50% of public teachers and 70% of private teachers showed that source of water for washing of hands is available in basins. This is similar to the case in Ofankor (Ghana) where Monney et al. (2014) found that 15 out of 20 schools were using shared basins with the other five schools, using functional hand washing stations with plastic/metal storage containers with taps and standpipes. The activities of schoolchildren using shared basins and shared towels in washing of hands are to be discouraged as pathogens that cause diseases such as diarrhoea continually spread among the staff and the teachers in the school.

In the public sector of childhood education programmes, it is seen that most of the children admitted into school are (4- 5) years of age. These children are no more in diapers and therefore diapering activities are not applicable to a majority of the teachers that was evident in 53.8% of the response of the public school teachers. However, a child in the kindergarten, once a while, soils themselves with faeces. Few public centres in the municipality have started admitted babies and infants, unlike the private sector where children under 2 years are admitted. Only 12.5% of public school

teachers had designated area for changing of diaper as against 37.5% in the private schools. Secondly, 13.8% of the public school teachers disinfected the diapered area after use as against 33.8% among teachers in the private sector. 5% of the public school teachers wrapped used diapers in a leak prof bag before disposing as to 25% of teachers in the private sector. Again, a majority of the teachers did not practice good diapering hygiene, which is contrary to the standards of American Academy of Paediatrics (2012). Changing of diapers according to the recommendations were to be performed in a designated area specifically diaper changing tables with large disposables tissue and separate from the children being handled. Thus, designated areas should not be used for any other activities such as playing ground. In addition, used diapers are to be placed in leak prof bag or leak prof containers to prevent minimal contamination of bodily fluid to the environment of the children. The area is then cleaned with household bleach diluted with water after each use (Agana, 2013). Considering the inadequate resources in both in the urban and rural communities, we can say that providing a large disposal mackintosh can add to the financial burden on parents and the schools; however, using reusable mackintosh and disinfected after each use can be financially moderate. The practice of using a diaper-changing table with large disposable tissues is feasible in the first class and internationally recognised early childhood educational centres. In Kotch et al.'s (2007) study, it was found that intervention centres received new diaper-changing equipment. Both intervention and control centres received hygiene and sanitation training with reinforcement and follow-up as needed. The results of the study showed that diapering equipment designed to reduce the spread of infectious agents

significantly reduced diarrheal illness among the children and absence because of decreased illness among staff in out-of-home childcare centers. Kotch et al. (2007) further found that, the impact of the equipment can add value to the impact of training in proper diaper-changing and hand-washing that has been observed in previous studies.

In the rural community, 21.3% of the teachers in the public sector and 7.6% private school teachers responded that children who soiled themselves with faeces and urine were not cleaned; rather, they had to go their various homes for them to be cleaned up. This is because parents would not buy toiletries like soaps, detergents, antiseptic, and tissues unlike in the urban centres where it is mandatory for the parents to do so. The question is: What happens to a child who is suffering from diarrhea, goes the house, and does not meet his parents at home? It is obvious that, there would be leakage of faecal content along each path the child finds himself, contributing to the spread of infection within the community.

Jimenez et al. (2010) conducted an intervention study with 40 children in investigating the contamination of children's toys and their hands during play. The researchers detected fecal coliforms on both toys and children's hands. *Klebsiella pneumoniae* was found on hands at a mean concentration of 2.7 × 102 log CFU/50 cm2 per toy. *E. coli* was also found at a mean concentration of 2.4 × 102 log CFU/50 cm2 per toy, which meant that environmental contamination by enteric bacteria and viruses on shared objects such as toys in the child-care setting through mouthing behaviour provides the opportunity for ingestion of enteric pathogens, especially in infants and toddlers. Based on evidence of enteric pathogens found on toys, it is important

that toys that children put in their mouths be disinfected daily after use, to prevent cross contamination among the children (Agana, 2013). The findings of the present study shows that, public teachers had a mean rating score of 1.7 whereas private teachers had a mean rating score of 1.88, which is an indication of a very poor practice as decontamination of toys used by the school children.

Furthermore, the present study indicated that school children who come to the school without cups share cups and water bottles with their friends. Other classrooms especially the public schools provided communal cups for children who did not come to school with their own cups. However, the practice of sharing cups is to be discouraged as most communicable diseases such as measles and chickenpox can be found in oral secretions though some of the diseases are airborne.

The ratio of a child to a toilet facility shows that more than 28 children use one toilet facility even though the majority of the teachers used their own toilet facilities. The practice of child to toilet ratio contradicts the right ratio given by UNICEF as 20 children per one toilet facility. AAP (2011) also recommends the ratio of 10 children to one toilet facility and that should be accompanied by hand washing facility. For that reason, adequate cleaning of toilets and urinals, one with the appropriate disinfectants and detergents is necessary to prevent the spread of disease and promote health through safe and hygienic waste disposal in children. Consequently, the present study showed that there was a poor practice with regard to cleanness of the toilet. Early childhood centres attached to primary schools shared the same toilet facilities with the primary pupils because most of the childcare centres are attached to

primary as well as junior high schools. Over 16.3% response from teachers revealed that there was no toilet facility for the children to use. Instead, the children had to use public toilet used by the whole community. The findings of the study is similar to Boateng (2008) who found that as much as 15 out of the 30 schools had no toilet facilities. Pupils also used the toilet for the whole community. Among the 15 schools that had toilet facilities, only two kept this facility well maintained and clean. These schools had benefitted from the Highly Indebted Poor Country (HIPC) initiative. The study further indicated the toilet facility was poorly maintained, making it unconducive to the health of the children. Enand and Gan (2011) is of the view that structure, cleanliness, and general outlook of latrines are implicated in the rate of utilization of sanitary facilities by the schoolchildren, with children being more likely to utilize well-kept sanitary facilities or outside sources. Nevertheless, anecdotal evidence in Suhum Municipality shows that despite children being in public schools or private schools, it has become mandatory for parents to supply the wards with detergent, toilet rolls, bleach, and cakes of soap termly. Therefore, the use of sanitary materials should be available to all schools without excuse of unavailability of sanitary materials in keeping toilet and urinals clean. Although as already discussed, some parents would not buy sanitary materials for their wards to use.

With respect to infrastructure on the provision of mosquito net, 87.5% responses from public school teacher as well as 61.3% responses from private school teachers indicated all classroom windows did not have mosquito-proof nets available. The mosquito proof nets do not only protect the children in the class from daytime mosquitoes, but also, they also prevent other insects such

as flies as well as dust from entering the class. The practice of mosquito profnet is to be encouraged in schools since some established early childhood education centres is found in mosquito endemic areas.

Barriers to the Practice of Infection Prevention

According to Llewellyn (2007), in a quality program, there need to be a small number of children per class and per caregiver, not more than 25 to 30 children in one class. Zomer et al. (2012) reported an association between the increased number of children per child-care provider and the decreased compliance in hand washing where a child-care provider took care of an average of four children. Monney et al. (2014), in their study, also indicated lack of funds to buy hand-washing items such as functional sinks, veronica buckets, and liquid soap dispensers as a barrier to hand washing practice. In the present study, it was found that over 30% of teachers took care of children between 40 and 70 children within a class. Subsequently, Boateng (2008) found hand-washing items locked in offices prevented effective hand washing in schools. Concisely, large numbers of children to few staff, inadequate funds, items locked in offices are barriers to effective hand washing. However, findings of the present study showed that teachers from both public and private childhood education centres did not see large number of children, inadequate time, inadequate funds, and items locked in offices as barriers to effective hand washing, even though there was a significant difference *(p*= 0.022), when the impact of resources on infection prevention practice among teachers was explored.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents the summary of the entire study and recommendations drawn from outcomes of the study. To this end, the chapter summarises the research objectives that guided the study, the methodology employed as well as findings of the study.

Summary

An establishment of early childhood educational centres in Ghana is on the rise due to mandatory reform of Ghana Education Service (2007) to attach every primary school with an early childhood educational centre. Secondly, the change of maternal role in society has also contributed to the setting up of early childhood educational centres by most private individuals. Babies, infants, and toddlers find themselves in the care of caregivers in early childhood education centres where a child spends an average of about 8 hours in the school. However, several studies like Nest and Goldbaum (2007), and Ramakrishnan et al. (2007) have confirmed an increased risk of infection among children who find themselves in the learning centres due to activities of caregivers on hand hygiene, diapering and disinfection practices as well as behavioral activities of the children like mouthing activities. Against this background, the present study sought to assess the knowledge level in addition to practice of infection prevention among caregivers within early childhood education centres in the Suhum Municipality.

The objectives of the study were to:

1. assess the knowledge level of teachers on infection prevention in early childhood education centres.
2. determine infection prevention practices among teachers in the early childhood education centres.
3. identify resource availability for infection prevention in the early childhood education centres.
4. identify barriers to the practices of infection prevention and control in early childhood education centres.
5. compare the knowledge level and practices of infection prevention measures among teachers in public and private early child education centres in the Suhum Municipality
6. determine the impact of demographic features of teachers in early childhood education centres on knowledge level and the practice of infection prevention.

The design employed for the study was descriptive quantitative comparative survey where 160 teachers in 52 randomly selected early childhood educators including crèches, day-cares, nurseries and kindergartens were recruited for the study in early childhood education centres in the Suhum Municipality. Descriptive analytical tools, (using mean, mode, and percentages in combination to Mann Whitney U Test for non-distributed variables, independent T test and one-way ANOVA for normal distributed data) were used to analyse data from the study.

The influence of demographic features on knowledge level, practice, resource availability and barriers to infection prevention in early childhood

education centres showed the distribution of knowledge of infection prevention is the same across the female and male teachers but the practice of infection prevention differs. There is also an indication that the ages of teachers in early childhood education centres do not have any corresponding effect on the knowledge of infection prevention and the practise of infection prevention, though one would argue that teachers above 45 years are more tolerant and experienced in childcare practices.

Statistically, there was significant difference of (p=0.001) when the impact of educational status of teachers on knowledge level of infection prevention was explored. In spite of the significant difference, the actual difference in the mean scores between the high school leavers and the diploma holders was moderate as eta value calculated was 0 .043. In the same way, there was no statistically significant difference recorded when the impact of educational status of teachers on the practice of infection and control was explored (p=0.378). The outcomes of the study indicated that diploma holders were more knowledgeable in infection practice than high school leavers probably due to academic content used in the training the diploma teachers as compared to the high school leavers.

In general, public school teachers and private school teachers had a good knowledge about infection prevention that was evident in the mean score 3.303 and 3.243 respectively. It was discovered that, the distribution of knowledge on infection prevention was the same across categories of teachers (public and private school teachers). However, Public school teachers and private school teachers practiced poorly with respect to infection prevention and control measures even though they had good knowledge about infection

prevention measures. Public school teachers' recorded a mean value of 2.42 while public school teachers recorded a mean value of 2.46 and there was no statistical significance difference between the two categories of teachers (p=0.411). This means that the distribution of practice of infection prevention is the same among the two categorises of teachers. Subsequently, the availability of resources for infection prevention measures in private educational centres was more than that of the public teachers even though the availability of resources in general was inadequate in the Municipality. There was a statistical significant difference in scores for public teachers and private teachers P<.0001(2-tailed) and with a large effect of magnitude for the difference. Similarly, the impact on resource availability on the practice of infection prevention when explored showed a significance difference of (p=0.022). Finally, teachers in public schools as well as private school early childhood education centres did not see large number of children, inadequate time, inadequate funds and items locked in offices as barriers to effective hand washing even though there was a significant difference (p=0.022) when the impact of resources on infection prevention practice among teachers was explored.

Conclusions

The outcome of the study is an indication that the level of understanding of both public and private school teachers regarding infection prevention in early childhood centres was not to be underrated though both categories of teachers had low compliance to infection prevention practice such as poor diapering technique, disinfection of used toys and maintenance of toilet facilities. Again, a majority of the teachers refute the reason that, large numbers of

children and lack of funds affected their low compliance on hand hygiene. Then the possible reason for low compliance on infection prevention was a behavioral problem based on lack of supervisory roles played by heads of institution of early childhood education centres and Public health officials.

Recommendations

Teachers in the present study had a good knowledge about infection prevention yet there were still some degrees of deficit in knowledge level concerning bodily fluids such as mucus and urine being source of infection in the schools. It is recommended that caregivers in childhood education centres especially teachers should receive in-service training from the Ministry of Health in collaboration with the Ghana Education Service to educate children and staff on hygienic measures such appropriate hand hygiene, diaper techniques, disinfections techniques before and during employment in the childcare field. The training would enable all staff members in the educational centres to have a clear understanding of their role in preventing the spread of infection. They must also be acquainted with the policies and procedures that are in place to control infection in the school in the childcare setting. Posters on effective prevention measures such as diapering procedures in the classroom is to be encouraged to continually remind staff of appropriate procedures.

The Ghana Education Service in conjunction with Ghana Environmental Agency and Ministry of Health should make it mandatory for childcare providers to provide adequate resources such as potable water, appropriate toilet facilities, well covered dustbins and appropriate disinfectants, before and during establishment of early childcare centre.

In addition, effective supervision by public health officials such public health nurses, school nurses, environmental sanitation officers and the school health coordinator is encouraged to re-enforce attitudinal change in staff members. Observation of appropriate measures of infection prevention by staff can be used as an evaluation tool or appraisal for staff assessment.

Suggestions for Further Studies

The study was conducted in the Suhum Municipality, which does not reflect the knowledge level and practices of teachers in other settings of the country. Further studies are encouraged to be carried out in more municipalities using different study designs such as observational studies.

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APPENDIX A

QUESTIONNAIRE FOR TEACHERS IN EARLY CHILDHOOD CENTRES ON INFECTION PREVENTION AND CONTROL MEASURES

Please read each question carefully and follow any statements that appear in bold or parentheses. Tick the best answer or fill in the requested information. If you come to any question, you do not want to answer, go on to the next question. Thank you for your participation in this project.

Demographic data

1. Gender

□ Male □ Female

2. Age (years)

□ 18-24 □ 35-44

□ 25-34 □ 45+

3. What is the highest-level of education you have completed? Please tick one

□ High school □ Cert A□ diploma.

□.Degree □ post graduate level

4. How long have you been a childcare teacher?

5. How many children are in your class?

For each statement, please tick one box below to show how much you strongly agree, agree, strongly disagree or disagree.

Knowledge Level of infection prevention and control of Teachers

Statement Number	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
1.	The children we take care of in the school are possible source of infection to school children and the teachers				
2.	A child who is sick could be a source of infection to other children				
3.	A child who is infected with a disease can also spread the infections to family members and caregivers				

Statement Number	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
4.	A child who is sick from an infectious disease and comes to school can further spread the disease to other children.				
5.	A child who has no symptoms of an infectious disease may transmit infections to other children and family members.				
6.	Disease causing organisms such as virus, bacteria and fungi could be found in the school premises.				

Statement Number	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
7.	These body fluids may also contain pathogens that can be a source of infections in the schools.				
	Saliva				
	Vomitus				
	Urine				
	Faeces				
	Blood				
	Mucus				
8.	The following are also possible source of infection in the school: Toys				
	Door Knobs				
	Water Closet Handles				
	Classroom Floors				

Statement Number	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
9	Children failing to wash their hands after visiting the toilet can be source of infection to other children				
10	Non washing of hands could be potential source of infection to the children we care				
11.	A child putting contaminated toys in their mouth can transmit infection to other users.				
12	Children who are in diapers may also transmit diarrheal infections to other children in the school through faecal contamination of teacher's hands, clothing, changing tables and leakage.				
13	Very young children using the bathroom or toilet without supervision spread diarrhoea diseases				

Statement Number	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
14	Four or more children in a class having similar diarrhoea symptoms at the same time might have an outbreak of diarrhoea diseases				
15	An infected expressed breast milk given to a child could be a source of infection to the child				
16	A teacher who is infected with tuberculosis and is productive (producing phlegms) can easily transmit infection to the children and the staff in school.				
17	Respiratory diseases like tuberculosis and influenza are spread by droplets from sneezing or coughing which enters the respiratory tract through the nasal passages, or mouths of other children.				

Statement number	Statements	Strongly agree	Agree	Strongly disagree	Disagree
18	Chicken pox and measles can spread in the air or by infected secretions on objects that are then handled by others				
19	Contagious nasal secretions can also be passed directly to other children or through contact with contaminated surfaces.				
20	Many children in a limited space facilitate transmission of infection.				

Statement Number	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
21	Close contact that occurs between children can promote skin diseases such as such as scabies, head lice and ring worm				
22	A child who is infected with a disease could have long term consequences.				
23	A child who has measles or chicken pox should be managed at home until rash disappears.				

Statement Number	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
24	Covering the mouth with a tissue when sneezing or coughing can prevent the spread of infections such as influenza and tuberculosis				
25	Hand washing with soap and water protects children from diarrhoea and respiratory infections				
26	Alcohol-based hand sanitizer is as effective as soap and water when the hands are not visibly dirty				

Statement Number	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
27	Hand washing should be performed under the following circumstances;				
	After cleaning nasal secretion of children				
	After diapering or toilet use.				
	Before feeding the children				
	Whenever hands are contaminated with blood or other bodily fluids such as faeces				
	Before giving medications				
	After giving medications				
	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
	Before and after treating and bandaging a child with wound				
28	Household bleach (paraxone) is a better disinfectant than all other disinfectant				
29	Cleaning urinals, bathroom facilities and toilet daily with bleach daily could prevent diseases in the school.				
30	Diaper-changing surfaces should be disinfected after each change				

Statement Number	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
31	All spillages of blood, faeces, and vomitus should be cleaned up immediately.				
32	Every teacher employed in the school must do medical examination such as typhoid and tuberculosis test.				
33	Every child who is admitted into the school must be up to date immunised regarding the childhood killer diseases.				

Statement Number	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
34	Teachers should have service training on hygienic measures in other to take care of the children in the school				
35	A teacher with fewer number of children have enough time to care for the children				

Practices of Teachers Concerning Infection Prevention

For each statement, please tick one box below to show whether the practice is performed always, sometimes or never.

statement number	Statements	Always	Sometimes	Never
36	When a child has runny nose, that child's nostrils is cleaned with clean disposable tissue			
37	Hand hygiene is performed; Upon arrival from home			
	Statements	Always	Sometimes	Never
	Before I eat			
	statements	Always	Sometimes	Never
	Hand hygiene is performed;			
	After I coughed/sneezed/wiped my nose			
	After contact with urine, faeces and vomitus			
	After changing a diaper			
	After I assist children with toilet use/wiping buttocks			
	When my hands looks dirty			
	After the children have returned from break			
	Before giving medication			
	After giving medications			
	Before and after treating and bandaging a child with wound.			

Statement Number	Statements	Always	Sometimes	Never
38	A cake of soap is used in washing of hands by children and teachers			
39	Children share communal towels after washing of hands			
40	During eating time, children use spoons provided by the school to eat.			
41	Children who come to the school without cups shares cups and water bottles with their friends.			
42	After playing, toys used by children are washed with mild disinfectant			
43	Children who are bottled fed have their names labelled on their prospective bottles			
44	When a child soils himself or herself, that child is cleansed.			
45	When a child's diapers are changed, the area where the changing took place is cleaned with a disinfectant			

Statement Number	Statements	Always	Sometimes	Never
46	After changing a diaper of a child, the used diaper is wrapped in a leak-proof bag (polythene).			
47	When there is spillage of blood, vomitus and faeces in the classroom, the classroom floor is mopped immediately			
48	During cleaning of vomitus, faeces and blood, gloves are worn			
49	Toilet seats in the schools are clean.			
50	Water closets handles are clean			
51	Teachers share toilets and urinals with the children			
52	If a child vomits, urinates or soils the floor, a detergent is used to clean the floor.			
53	Bleach (parazone) is used to clean the toilet			
54	More than 28 children use one toilet facility			
55	Children sleeping mats are cleaned and dried in the sun			

Availability of Resources for infection control

For each statement, please tick one box below to show whether the resources mentioned are available always, sometimes or never.

Statement number	Statements	Always	Sometimes	Never
56	Running water is available for children and teachers to use in washing of hands			
57	Source of water for washing of hands are available in basins			
58	Functioning Washing sink is available in every classroom			
59	liquid soap in a dispenser is available for use during hand washing			
60	Alcohol based sanitizer is readily available for teachers and children for use during hand washing			
61	Disposable tissues are available for wiping of hands after hand washing			
62	Fabric towels are available for wiping hands after washing			
63	Disposable tissues available for cleaning mucous nostrils of children			
64	Different mops are available for cleaning the school kitchen, classroom floor and the toilet			
65	More than one teacher is available in a classroom.			
66	Bleach is available for cleaning the toilet, bathroom and urinal			
67	All Classroom windows have mosquito proof net available			

Statement Number	Statements	Always	Sometimes	Never
68	Designated area available for changing of diaper			
69	Dustbins in every class with well covered lid are available for rubbish collection.			
70	Clean drinking water is available for the children			
71	Good ventilation available			

Barriers to the Practice of Infection Prevention

For each statement, please tick one box below to show how much you strongly agree, agree, strongly disagree or disagree.

Statement number	Statements	Strongly agree	Agree	Strongly disagree	Disagree
72	I am not able to wash the children's hands always because, the children are many				

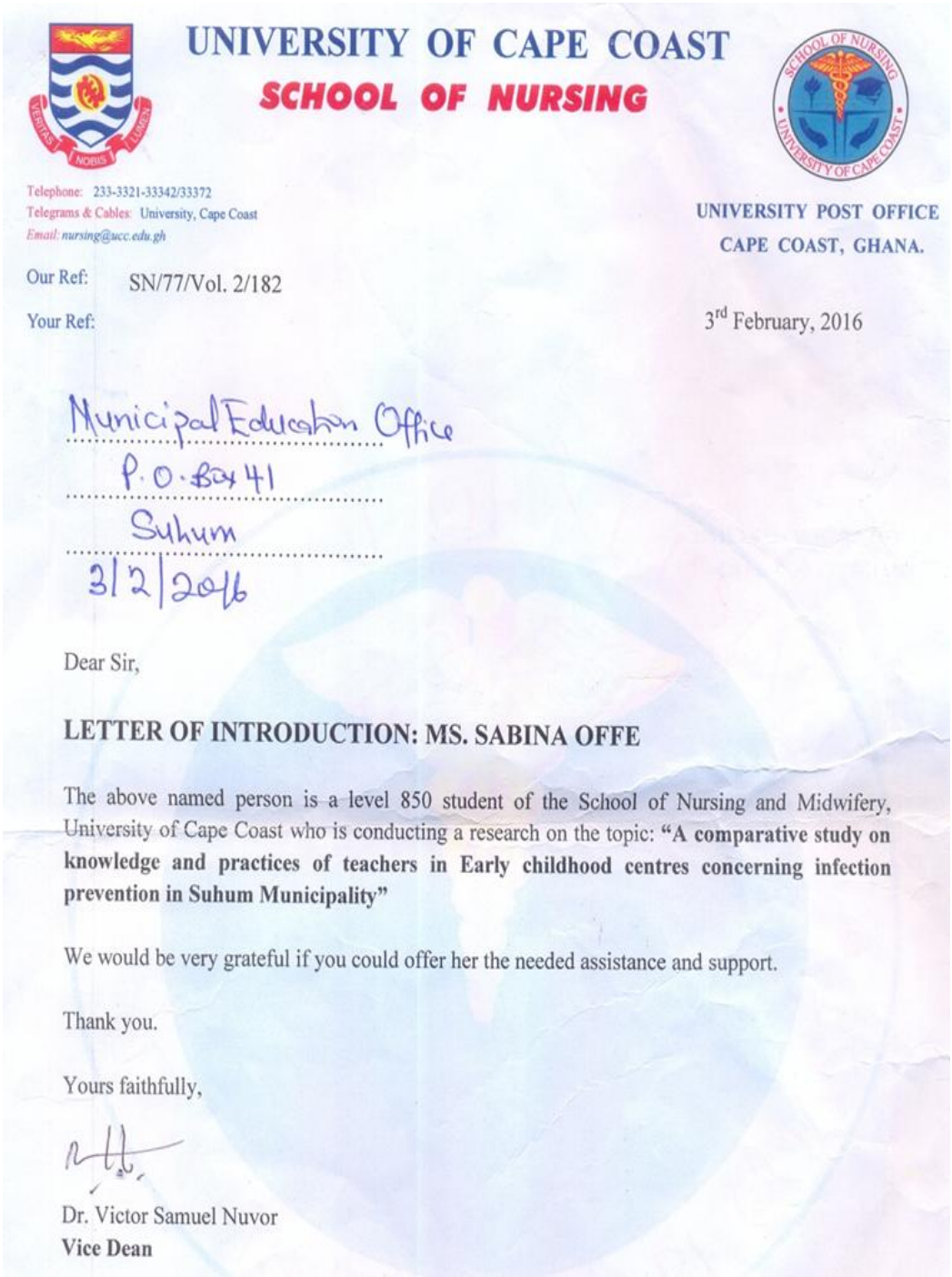
Statement Number	Statements	Strongly Agree	Agree	Strongly Disagree	Disagree
73	I am not able to wash the children's hands after playing because I don't have time.				
74	I do not wash my hands always, because I think, it is not necessary.				
75	The children do not wash their hands, because there is not enough money in the school to buy hand hygiene products such as towels, liquid soap and alcohol hand rub				

Statement number	Statements	Strongly agree	Agree	Strongly disagree	Disagree
76	The children and I do not wash our hands because the washing items are locked in the offices				
77	Classroom is not mopped frequently because, there is fewer staff				

Thank you for completing this questionnaire and for your assistance in this important project.

APPENDIX B

INTRODUCTORY LETTER FROM SCHOOL OF NURSING



UNIVERSITY OF CAPE COAST
SCHOOL OF NURSING

Telephone: 233-3321-33342/33372
Telegrams & Cables: University, Cape Coast
Email: nursing@ucc.edu.gh

UNIVERSITY POST OFFICE
CAPE COAST, GHANA.

Our Ref: SN/77/Vol. 2/182

Your Ref:

3rd February, 2016

Municipal Education Office
P.O. Box 41
Suhum
3/2/2016

Dear Sir,

LETTER OF INTRODUCTION: MS. SABINA OFFE

The above named person is a level 850 student of the School of Nursing and Midwifery, University of Cape Coast who is conducting a research on the topic: **"A comparative study on knowledge and practices of teachers in Early childhood centres concerning infection prevention in Suhum Municipality"**

We would be very grateful if you could offer her the needed assistance and support.

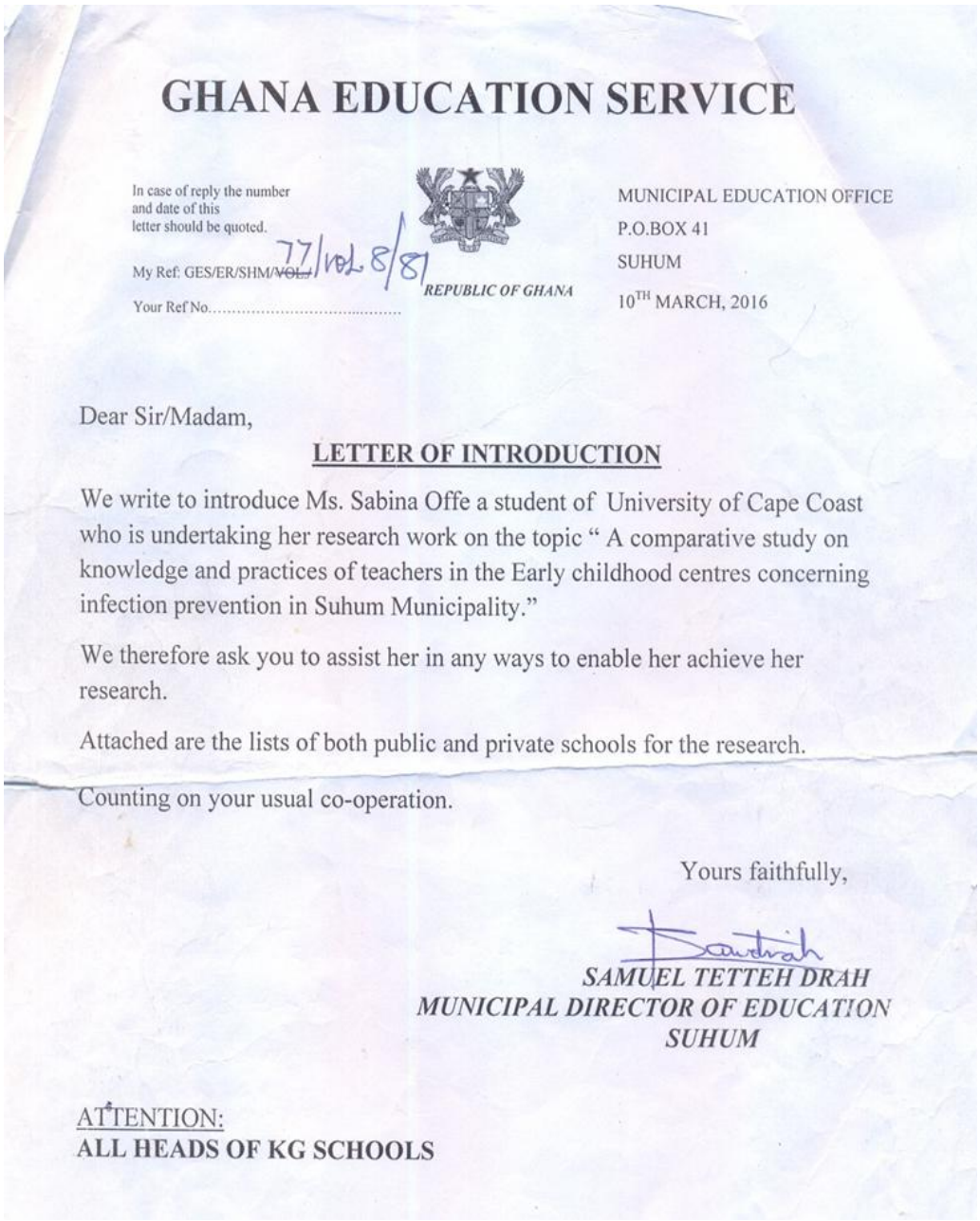
Thank you.

Yours faithfully,

Dr. Victor Samuel Nuvor
Vice Dean

APPENDIX C

INTRODUCTORY LETTER FROM SUHUM MUNICIPAL GHANA EDUCATION OFFICE



GHANA EDUCATION SERVICE

In case of reply the number and date of this letter should be quoted.

My Ref: GES/ER/SHM/~~VOL.1~~ 77/Vol.8/87

Your Ref No.....

REPUBLIC OF GHANA

MUNICIPAL EDUCATION OFFICE
P.O.BOX 41
SUHUM
10TH MARCH, 2016

Dear Sir/Madam,

LETTER OF INTRODUCTION

We write to introduce Ms. Sabina Offe a student of University of Cape Coast who is undertaking her research work on the topic " A comparative study on knowledge and practices of teachers in the Early childhood centres concerning infection prevention in Suhum Municipality."

We therefore ask you to assist her in any ways to enable her achieve her research.

Attached are the lists of both public and private schools for the research.

Counting on your usual co-operation.

Yours faithfully,

SAMUEL TETTEH DRAH
MUNICIPAL DIRECTOR OF EDUCATION
SUHUM

ATTENTION:
ALL HEADS OF KG SCHOOLS