

Are Creches a Haven for Child Care or Cesspool for Infection?

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Abstract

The increasing number of Nigerian women in the labour force and disintegration of the extended family system, has led to demand for alternative means of caring for children. Crèche facilities serve as alternative sources of childcare. This study aimed at assessing the adequacy of crèches in a community in Nigeria to offer child care.

The study employed a descriptive cross-sectional study design; a total of 14 out of 18 crèches in the town were assessed using a checklist (78% response rate), only 62% of parents of enrolled children accepted to be interviewed while all care givers were interviewed with a questionnaire. Swab samples for microbiological analysis were collected from floors, beddings and toys in the crèches and subjected to microbiological analysis.

Less than two-fifth (38%) of caregivers had good knowledge about early childhood care. About two-thirds (65%) of the caregivers had some training in early childhood care. None of the creche had an infection control policy while a little over half (57%) had good environmental hygiene status, 93% had good safety practices and 71% had fair infection control practices. Organisms isolated are *Staphylococcus aureus* (59%), Aerobic spore bearer (13%) and *Proteus vulgaris* (5%) while 28% yielded no growth. *Staphylococcus aureus* was resistant to second line antibiotics and only 44% were sensitive to Gentamicin. *Proteus vulgaris* was resistant to most antibiotics but sensitive to Gentamicin.

Knowledge of care givers about childcare practices was poor. Infection control practice was fair despite absence of infection control policy.

Keywords: caregivers, creche, day care, infection

1. Introduction

Though childcare is a gender role, in Nigeria as in other African societies, women in the traditional system are by their social and physiological makeup responsible for child rearing and home keeping (Asekun-Olarinmoye, Oyemade, & Lawoyin, 2005). However, with industrial revolution and modernization, it became difficult or almost impossible for some mothers to fully cater for their babies as it used to be. Several women became engaged in paid, career employment either because of economic reason or the need to improve their status and support the family (Agbedeyi, Eke, & Nte, 2015; UNESCO, 2006; Hand, 2005). Thus, day-care as an alternative source of childcare has become a necessity rather than an option (Asekun-Olarinmoye et al., 2005) as women employed outside the home need to provide alternative adequate and sufficient care for their infants.

Child care is defined as the provision of supervision, protection and ensuring at a minimum, the basic needs of a child for work days spanning more than three hours a day but less than twenty-four hours a day (Colbert, 2005). Crèche facilities should therefore provide psychosocial stimulation, a healthy and safe environment, protection and security; these facilities should inculcate in the child the spirit of enquiry and creativity through the exploration of nature, the environment, art, music and playing with toys, effect a smooth transition from the home to the school, prepare the child to adapt successfully when their current context changes, provide adequate care and supervision for the child while their parents are at work and inculcate in them the basic social norms – that is, culturally relevant skills and behaviour which shall allow them to function effectively in their current context. While crèche facilities seem to meet this need, most day care centres are owned by private enterprises that are at most times motivated by profit (UNESCO, 2006).

Knowledge of the process of children growth and development is the cornerstone of quality early childhood care. It lays the foundation for designing the environment and curriculum for observing, assessing, and integrating diverse learners (Early Childhood Advisory Council [ECAC], 2015). In the early stages of development, it has been observed that children who develop the best are those who have attention and enjoy a variety of fun plays (Amosu, Atulomah, Thomas, Olanrewaju, & Degun, 2011). It is said that between the sixth and the seventh months of life when children begin crawling, they need to have someone who is excited to teach them, most caregivers are not as excited to teach the child or devote much attention to individuals as the parent who will readily respond to the child's needs for affection and attention. Although there has been a rapid expansion in Early Child Development (ECD) and pre-school services, the quality of many ECD centres (both public and private) leaves much to be desired and only a relatively low proportion of children benefit from their services (UNESCO, 2006).

Research findings show that pre-school children who spend more time in structured day-care settings, have higher risk for infection than their counterparts who do not (Asekun-Olarinmoye et al., 2005). Children cared for at daycare/creche or in preschool education exhibit a two to three times greater risk of acquiring infections, which impacts both on individual health and on the dissemination of diseases through the community (Amosu et al., 2011; Nesti & Goldbaum, 2007). The reasons for this are not farfetched; establishments that provide out-of-home care for preschool age children are known to be environments with special epidemiological characteristics, since they have populations with characteristic profile and with specific risks for the transmission of infectious diseases (Gensheimer, 1994). Children have habits that facilitate the dissemination of diseases, such as putting their hands and objects in their mouths, very close interpersonal contact, fecal incontinence during the phase prior to the acquisition of sphincter muscle control, the absence of the habit of hand washing and other hygienic practices and the need for constant direct physical contact with adults (Nesti & Goldbaum, 2007; Moronkola, 2003). While local and international studies have been conducted on the health of children in day care centres, there are few reports on the structural adequacy of crèche facilities and competence of caregivers in offering child care. Hence, this study assessed the knowledge of caregivers on early child care practices and structural adequacy in terms of infection control; level of hygiene and identification of common pathogens in the crèches.

2. Materials and Methods

This study was conducted in the Ife central local government area of Osun state in Nigeria. Ile Ife is an ancient town in Yoruba history and regarded as the cradle of civilization. The main occupation of inhabitants includes farming, trading and civil service among others.

2.1 Study Design

The study employed a descriptive cross-sectional study design.

2.2 Target and Study Population

The target population consisted of the parents of the children enrolled and cared for in crèches and preschool facilities and the staff of the facilities in the study area. All crèches in the study area were included in the study, though a total of 14 out of 18 crèches consented (78% response rate); all parents of enrolled children were interviewed but only 62% responded and all care givers in the crèches were interviewed (100% response rate).

2.3 Data Collection Methods

In eliciting data from the respondents, the study utilized the quantitative method of data collection. A self-administered pre-tested, semi structured questionnaire was administered on the parents of the enrolled children and their caregivers. The questionnaire for parents consisted of six sections which are: bio-data; awareness of child care services; diet; health and safety; environment and quality of care and support while the questionnaire for the staff in the crèche has three sections: biodata; assessment of knowledge of child care and attitude towards child care. In addition, a walk through facility checklist elicited information on the environment, infection control, child care practices and safety.

Environmental samples were collected aseptically from the floors, beddings and toys in the crèches using a sterile swab moistened with sterile water following standard procedures (APHA, 2005); the samples were thereafter transported to the analytical laboratory and subjected to microbiological investigations to assess for prevalent microbes.

2.4 Microbial Analytical Test Procedure

The swab samples were inoculated using McConkey and Chocolate agar and incubated at 37°C, the colonies that grew were gram stained and biochemically analysed. Preliminary characterization of bacteria isolates was based on Gram stain and observed morphological characteristics. Colonies that gave gram positive coccal appearance on

gram staining were tested for the enzyme catalase to distinguish staphylococci from streptococci. Catalase positive, gram positive cocci suggestive of staphylococci were tested for coagulase production by the rapid slide and tube tests using citrated human plasma. Further characterization of other bacterial isolates like Gram negative rods were based on the following tests (using gram negative kit): oxidase test, indole production, citrate utilization, urease production and carbohydrate fermentation.

2.5 Antimicrobial Sensitivity Test Procedure

The microbial isolates were subjected to drug sensitivity tests. Antimicrobial susceptibility test of the isolates were performed by the Bauer-Kirby method (1966) as modified by the National Committee for Chemical Laboratory Standards (NCCLS, 1993), colonies of the isolates were suspended in sterile bijoux bottles containing 5mls of peptone water. A sterile cotton wool swab was inserted into each bottle containing the standardized inoculum suspension. The swab was rotated several times with firm pressure on the inside wall of the bottle to remove excess fluid and then used to inoculate well dried plates of diagnostic sensitivity agar. The following conventional antibiotic discs were placed on the inoculated diagnostic sensitivity test plate using sterile forceps- Erythromycin (10g), Gentamicin (10g), Nalidixic acid (30g), Cefrixon (30g), Cloxacillin (5g), Tetracyclin (25g), Amoxicillin (25g), Cotrimoxazole (25g), Chloramphenicol (30g) and Ofloxacin (30g). All plates were incubated at 37°C for twenty-four hours. The diameters of the zone of inhibition were measured to the nearest millimeter using a ruler.

2.6 Data Analysis

The questionnaires were analyzed using the SPSS software version 20. Uni-variate analysis was presented using tables and charts as appropriate. Composite variables were generated by summing all attributes in the different domains (environmental status; infection control; safety practices; knowledge and attitude of caregivers on child care) and using scores of good (>70%); fair (50-69%) and poor (<50%). In addition, the environmental status was assessed through a composite score that assessed the general conditions of the crèches, the floors and walls, toilets and playgrounds. Fifteen items were scored and a score of < 8 was tagged poor; 8-11 tagged fair and ≥ 12 as good environment, respectively.

In the same manner, infection control was assessed through a composite score that assessed hand washing practices and other infection control indices like availability of running water, soap and waste disposal. A maximum obtainable score was 13 and a score < 7 was tagged poor; 2-10 tagged fair and > 10 as good infection control conditions. Also, the safety practices were assessed through a composite score that assessed emergency contact information of the enrollees, fire escape plans, fire extinguishers, proper storage of chemicals and covering of electrical outlets. A maximum obtainable score was 7 and a score of < 4 was tagged poor; 4-5 tagged fair and > 6 as good safety practice.

Knowledge of caregivers on early childhood care was assessed through a composite score using knowledge on developmental milestones, importance of hand washing, recognizing common childhood ailments, administering first aid, referring sick children to trained medical personnel, conducting a health inspection for a child and conducting monthly growth monitoring and recording. A maximum obtainable score was 7 and a score of < 4 was tagged poor; 4-5 tagged fair and > 6 as good knowledge of caregivers.

2.7 Ethical Consideration

Permission was obtained from the owners of the creches, an informed written consent was obtained from the respondents during the course of data collection; they were also assured of confidentiality and that all information obtained will be used only for research purposes, verbal consent was obtained before conducting the interview and the checklist assessment of the facilities and Ethical approval was sought from the ethics committee of the Institute of Public Health at the Obafemi Awolowo University in Nigeria.

3. Results

Table 1 shows the socio- demographic characteristics of the caregivers. A preponderance of the workers in the crèches assessed were women (96.2%) with ages ranging between 19 and 58 years, a third of whom were between 19-28 years old. About four-fifths of the workers have some form of formal education with 46.1% having post-secondary school education; 61.5% of the workers were married, 88.5% were Christians and 84.6% were of Yoruba extraction.

Table 1. Socio-demographic Characteristics of Caregivers

Variable	Frequency N=26	Percentage (%)
Gender		
Male	1	3.8
Female	25	96.2
Age		
19- 28	8	30.8
29-38	6	23.1
39-48	4	15.4
49-58	8	30.8
Highest Level of Education		
Below SSC	4	15.4
SSC	10	38.5
Post secondary	12	46.1
Marital Status		
Single	5	19.2
Married	16	61.5
Divorced/Widowed	3	11.5
Non responders	2	7.7
Religion		
Christianity	23	88.5
Islam	3	11.5
Ethnicity		
Yoruba	22	84.6
Igbo	2	7.7
Ibibio	2	7.7

Table 2 shows the demographic characteristics of the enrollees. A higher percentage of the enrollees were female (51.2%), aged more than twelve months (64%) and were enrolled at ages seven months and above (62.6%).

Table 2. Socio-demographic Characteristics of Enrollees

Variable	Frequency N=80	Percentage (%)
Gender		
Male	39	48.8
Female	41	51.2
Age of Children		
4-6 months	7	8.8
7-12 months	22	27.5
>12 months	51	63.8
Age of children at Enrolment		
≤3 months	10	12.5
3-6 months	20	25.0
7-12 months	25	31.3
>12 months	25	31.3

Table 3 shows that about two-fifth (42%) of the caregivers have knowledge on developmental milestone, a greater preponderance (96%) of the caregivers have knowledge on the importance of hand washing in early childhood care and recognizing early childhood illnesses. Ninety two percent of the caregivers have knowledge on administering first aid to children in the crèches while about three-fourth (77%) and 61% of the caregivers have knowledge on the proper time for referral of sick children for expert management and knowledge on how to conduct a health inspection of the children in their care respectively. Little over a third (34.6%) of the caregivers have some knowledge on conducting monthly growth monitoring and recording. Overall, 38 percent of the caregivers have good knowledge of early childhood care.

Table 3. Assessment of Knowledge of Caregivers on Early Childhood Care

Knowledge of Caregivers	N(%)
Knows about developmental milestones in children	11(42.3)
Knows about importance of hand washing	25(96.2)
Recognizes common childhood ailments	25(96.2)
Knows how to administer first aid	24(92.3)
Knows the appropriate time and process of referral	20(76.9)
Knows how to conduct health inspection	16(61.5)
Knows how to conduct monthly growth monitoring and recording	09 (34.6)

Figure 1 shows that about two-thirds of the caregivers (65%) have some form of special training in early childhood care.

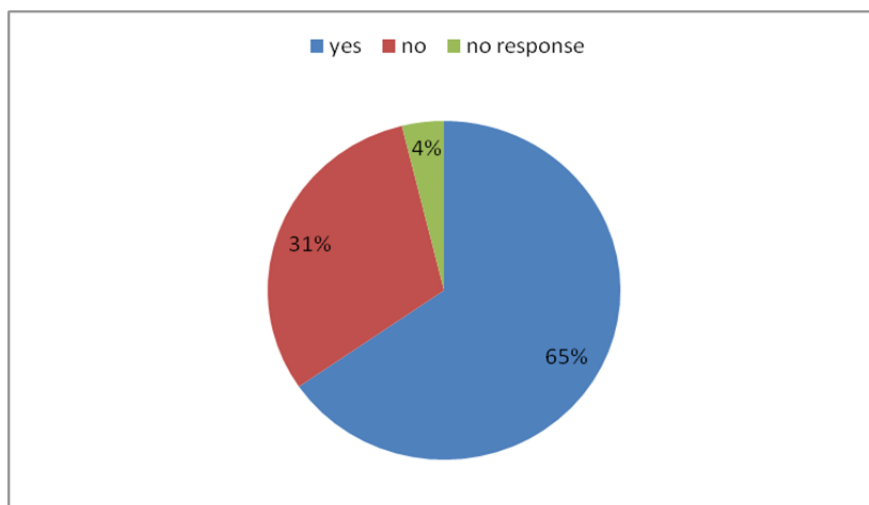


Figure 1. Proportion of Caregivers who received Some Special Training in Early Childhood Care

As shown in Table 4, almost all (92.9%) of the creches were fenced, 57.1% were painted, no source of air pollution was observed in all the creches while 4 (28.6%) of the creches had cracks on the wall and soiled diapers on the floor but none of the facilities had floor littered with rubbish. Assessment of the toilet showed that 10 (71.4%) of the toilets had wet floors, 7(50%) were smelly, 6(42.9%) had running water and 13(92.9%) had toilets fitted with water-closet system. Assessment of the playground showed that 13 (92.9%) of the creches had no sharp objects on the playground, there were no dead insects or animals in any, all had spacious playgrounds and 10 (71.4%) had toys available within the creche. The environmental index showed that 8 creches (57.1%) were assessed as having good environmental status and 6(42.9%) had fair environmental status.

Table 4. Environmental condition of Creches in Ile-Ife

Environmental condition	N=14	%
General surrounding		
Facility fenced	13	92.9
Walls painted	8	57.1
Floor littered with rubbish	0	0.0
Cracks on wall	4	28.6
Cobwebs on wall	5	35.7
Soiled diaper on the floor	4	28.6
No air pollution (from burning/cooking inappropriately)	14	100
Toilet		
Wet floor	10	71.4
Smelly toilet	7	50.0
Water closet	13	92.9
Running water	6	42.9
Playground		
No sharp objects	13	92.9
Spacious	14	100.0
Toys available	10	71.4
Dead insects/animals	0	0.0

In Table 5, hand washing between handling different children was only observed to be done in 3 (21%) of creches visited while it was only in 2 (14.3%) of the facilities did we observe that hands were washed after diaper change and before preparing meals. Soap was available in 3 (21.4%) of the creches, running water was available in 8 (57.1%), toilet paper was available in 5 (35.7%), while overfilled garbage can was present in 2(14.3%) of the creches. Only 6 (42.9%) creches had lidded garbage cans. In addition, the composite infection control score showed that only 2 creches (14.3%) had good infection control practices while 10 creches (71.4%) had fair infection control practices and another 2 (14.3%) had poor infection control practices.

Table 5. Infection control practices of Creches in Ile-Ife

Infection Control Practices	Observed	Observed	Not observed
	done	Not done	
Hands are washed by staff in between handling children	3 (21.4)	10 (71.4)	1(7.1)
Staffers wash hands after each diaper change	2 (14.3)	11 (78.6)	1 (7.1)
Staffers wash hands before preparing meals	2 (14.3)	11 (78.6)	1 (7.1)
	Very clean	Clean	Dirty
Cleanliness of toys used by children	0 (0)	14 (100)	0 (0.0)
Soap available in creche	3 (21.4)		
Running water available in creche	8 (57.1)		
Toilet paper available in creche	5 (35.7)		
Garbage bin were overfilled	2 (14.3)		
Garbage bin has a lid/cover	6 (42.9)		

In Figure 2, 8 (57.1%) of the creches had emergency contact information of the guardian/parent of the children, only 1 (7.1%) had an emergency fire escape plan and none had fire extinguishers. In 13 creches (92.9%) staff purses were locked and kept out of reach of the children, all had bleach solutions and other chemicals kept out of reach of the children and in 10 creches (71.4%), electrical outlets were covered. In general, only 4 (28.1%) of creches had good safety practice while 9 (63.7%) had fair safety practice and 1 (7.1%) had poor safety practice.

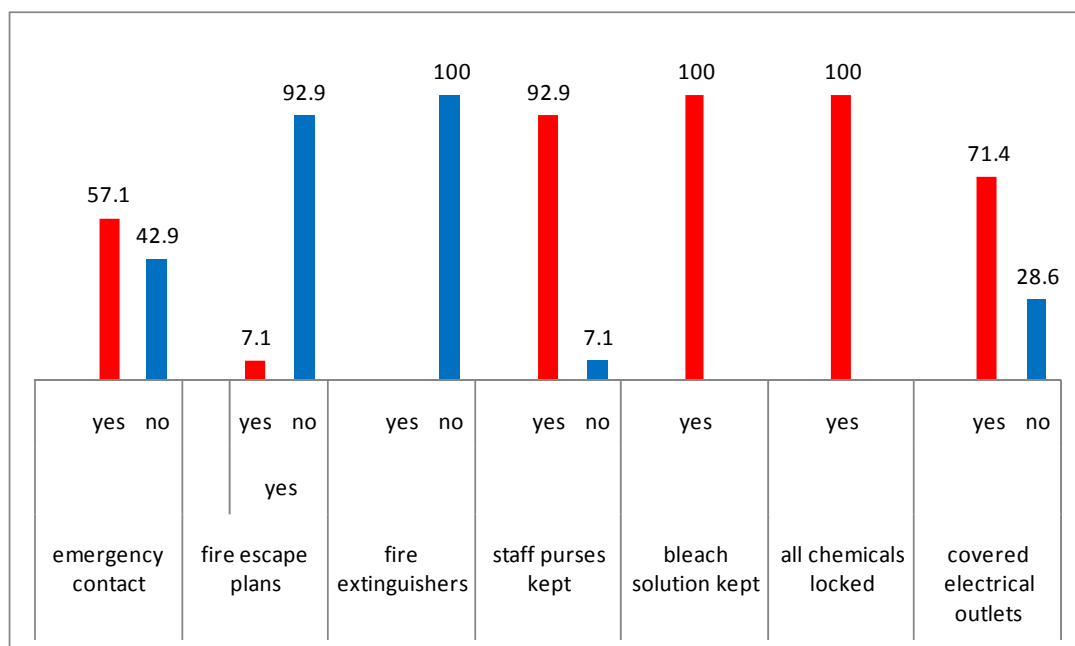


Figure 2. Safety Practices of Crèches.

In Table 6, only 2 facilities yielded no growth on all sampled surfaces while none of the samples grew fecal coliforms. Swabs taken from the beddings grew *Staphylococcus aureus* (38.4%), *Proteus vulgaris* (7.7%), aerobic spore bearer (23.1%) and 30.4% grew no organism. The swabs take from the toys showed that 53.8% grew *S. aureus*, 7.7% grew *Proteus vulgaris*, 7.7% grew aerobic spore bearer and 30.8% grew no organism. Swabs taken from the floors recorded *Staphylococcus aureus* (76.9%), aerobic spore bearer (7.7%) and no growth (15.4%).

Table 6. Isolated pathogens in the Crèches

Creche	Pathogen on beddings	Pathogens on Toys	Pathogen on Floors
1	<i>P. vulgaris</i>	<i>S. aureus</i>	<i>S. aureus</i>
2	<i>S. aureus</i>	No growth	<i>S. aureus</i>
3	No Growth	No Growth	No Growth
4	Aerobic spore bearer	<i>S. aureus</i>	<i>S. aureus</i>
5	<i>S. aureus</i>	No growth	<i>S. aureus</i>
6	No Growth	No Growth	No Growth
7	<i>S. aureus</i>	<i>S. aureus</i>	<i>S. aureus</i>
8	<i>S. aureus</i>	<i>S. aureus</i>	<i>S. aureus</i>
9	No growth	<i>S. aureus</i>	<i>S. aureus</i>
10	<i>S. aureus</i>	<i>P. vulgaris</i>	Aerobic spore bearer
11	Aerobic spore bearer	Aerobic spore bearer	<i>S. aureus</i>
12	<i>S. aureus</i>	<i>S. aureus</i>	<i>S. aureus</i>
13	Aerobic spore bearer	<i>S. aureus</i>	<i>S. aureus</i>
Summary(%)	<i>P. vulgaris</i> : 7.7%; <i>S. aureus</i> : 38.4%; Aerobic Spore bearer: 23.1% No growth: 30.8%	<i>P. vulgaris</i> : 7.7%; <i>S. aureus</i> : 53.8%; Aerobic spore bearer: 7.7% No Growth: 30.8%	<i>S. aureus</i> : 76.9%; Aerobic spore bearer: 7.7% No growth: 15.4%

In Table 7a, *Staphylococcus aureus* was 100% resistant to augmentin, amoxicillin, erythromycin and cloxacillin. 95% to cotrimoxazole, 92% to ofloxacin, 84% streptomycin, 80% to tetracycline, 67 chloramphenicol and 56% to gentamicin while in table 7b above: of the pathogen 100% were resistant to Augmentin, Nalixidic acid, Amoxicillin and Tetracycline respectively. However, 100% of the pathogens were sensitive to Gentamicin, 50% sensitive to ofloxacin and nitrofurantoin respectively.

Table 7a. Drug Sensitivity Pattern of the Pathogens (*Staphylococcus aureus*)

Drugs	Sensitive (%)	Resistant (%)
Augmentin	0	100
Ofloxacin	8	92
Gentamicin	44	56
Cotrimoxazole	5	95
Amoxicillin	0	100
Tetracycline	20	80
Erythromycin	0	100
Cloxacillin	0	100
Chloramphenicol	33	67
Streptomycin	16	84

Table 7b. Drug Sensitivity Pattern of the Pathogens (*Proteus vulgaris*)

Drugs	Sensitive (%)	Resistant (%)
Augmentin	0	100
Ofloxacin	50	50
Gentamicin	100	0
Nalixidic acid	0	100
Nitrofurantoin	50	50
Amoxicillin	0	100
Tetracycline	0	100

4. Discussion

In this study, the age of enrolment in creches was from 4 months which suggests that it is immediately after completion of maternity leave which is 3 months in Nigeria. This finding is supported by a study by Olaitan & Adeleke (2006) which posited that the ages of enrolment in creches are on the decline due to pressure to get back into paid employment by nursing mothers. While creches have become popular choices for care of children, the caregivers in these creches may not be adequately qualified to perform the duties. It was discovered that only 38% of the caregivers had good knowledge on early childhood care despite 65% having some form of special education in early childhood care; this suggests that the training received is not a panacea for behavioural changes in the caregivers. This value is much higher than the figure reported by Amosu et al. (2011) of 42% having early childhood care education.

In this study, 63.6% of the caregivers have experience less than five years which is much lower than 83.7% of the respondents having over 10 years experiences reported by Amosu et al (2011). These differences can be attributed to the recent establishment of the crèches in the study location or high attrition rates of the workers probably due to low remuneration or transition to other employments.

With over half (57.1%) of the crèches in this study having good environmental status, 92.9% having good safety practices and 71.4% have fair infection control practices, it is believed that the health and wellbeing of enrolees should be favourable with respect to less risk of transmission of diseases. This is further attested to by the isolation of only three organisms *Staphylococcus aureus*, *Proteus vulgaris* and aerobic spore bearer while no enteric organisms were isolated. In contra distinction to the isolation of thirteen different isolates in a study by Adedire, Oluduro & Bakare (2016); eleven isolates by Olaitan & Adeleke (2006) most of which were enteric.

The predominant organism isolated in this study was *Staphylococcus aureus* and the sensitivity pattern suggests a multi-resistant strain which is similar to findings from the study by Adedire et al. (2016). This high level of resistance to most antibiotics seems common in this environment and portends a poor prognosis as it will be difficult to treat infection in any child who becomes infected with it. This study also revealed that the most sensitive antibiotics to the gram negative isolates were ofloxacin and gentamicin and these isolates showed lowest sensitivity rates to Nalidixic acid, amoxicillin and augmentin, which is also in keeping with the study by Adedire et al. (2016).

It is thus pertinent to note that quinolones which can be useful based on the sensitivity pattern are not advisable in this age group and as such make infection picked up in creches difficult to treat. Presumptive use of antibiotics for minor infections without proper culture and sensitivity in this environment may foster such sensitivity patterns. The possibility of the spread of resistant bacteria from day care centres into families and then into the general community could represent a potential public health problem.

A major limitation of this study is the use of composite measures without applying weights to the different variables used in computing the measures.

In conclusion, while creches may be a veritable option for caregivers, proper care needs to be taken regarding infection control to make it safe for care of the child while regulatory provisions should be enforced relating to the establishment of creches in Nigeria.

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Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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