

**Sewage Management in Correctional Facilities and Its Public Health Implications in Rivers State, Nigeria**

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**Abstract**

This study investigated sewage management in correctional facilities and its implications for public health in Rivers State. The research design adopted for this study was the cross-sectional research design. A sample of 75 inmates who had spent at least, six months in the correctional facilities was drawn from three selected facilities in Rivers State. A multi-staged sampling procedure was employed to arrive at the sample. The instrument for data collection was a 17-item validated Sewage Management Correctional Facilities Public Health Implications Questionnaire (SMCFPHIQ) with a reliability index of 0.78 using Cronbach Alpha. A Focus Group Discussion (FGD) was also conducted with five (5) selected Correctional Facility Officers and the results presented qualitatively. Descriptive statistics of percentage and frequencies were used and results obtained, presented in tables. Findings revealed that pour flush was the most common type of toilet (46.7%) used for sewage management in correctional facilities. Unhealthy conditions always present in the sewage management facility were leakages from septic tanks (58.7%), odour nuisance (88%), overflow of fecal matters inside the toilet (68%) and irregular power supply for pumping of water (88%). Poor maintenance culture (33.3%) and negative attitude of inmates (20%) were the most common challenges affecting sewage management while fly infestation (66.7%), odour nuisance (74.7%), disease outbreak (66.7%), rodent infestation (70.7%) and unsightliness (88%) were always present with serious implications to public health. Improved maintenance culture, expansion of sewage management facilities and regular awareness programmes on sanitary use of facilities by inmates were recommended.

*Keywords:* sewage management, correctional facilities, public health implications.

**Introduction**

Correctional facilities are facilities used to confine persons convicted, remanded or awaiting trial for various degrees of crime in order to ensure safe custody, reformation and rehabilitation of the offenders under humane conditions (Tarhule, 2019). In Nigeria, correctional facilities hitherto known prisons were first established in 1861 with the declaration of Lagos as a Colony (Nigerian Correctional Service-NCS, 2023). Globally, prison population rate was estimated at 144 per 100,000; however, from the year 2000, it has grown by 20% above estimated 18% increment over the same period; United States has the highest prison population rate of 716 per 100,000 (Roy, 2015). In Nigeria, it is estimated that among every 2961 persons, there is a prisoner with a total estimate of 75,567 prisoners presently (Fatunmole, 2023). Studies show that many countries in the world, especially, developing countries have serious challenge in providing adequate sanitation facilities for citizens and as such, leaving people at risk of various related diseases (Fatunmole, 2023; World Prison Brief, 2023). Despite serious efforts made to improve sanitation, it is estimated that 2.4 billion people globally were still using unimproved sanitation facilities with majority of the population residing in Sub-Saharan Africa and Southern/Eastern Asia (Sustainable Development Goal-SDG Assessment Report, 2015). It is also estimated that the overall sanitation coverage in Nigeria is at 33% which is far below average, while only 30% of the population in sub-Saharan Africa (SSA) use improved private sanitation (Global Waters, 2022). At least 9.1% of global disease burden and 6.3% of all deaths would be prevented if sanitation was considered (Bartram et al., 2008). Sanitation is critical in health, survival and development of any population world-over.

It is believed that greater gaps in sanitation deficiencies exist among vulnerable groups, especially, prisoners due to overcrowding which exerts so much pressure on available facilities

(Millennium Development Goals-MDG Assessment Report, 2015). Most of the prison systems in the world do not function at the level of the United Nation Standard Minimum Rules (UN-SMR) for the Treatment of criminal offenders which are basic international standards. One of the central problems in prison management around the globe that poses serious challenge to the health and wellbeing of inmates are associated with poor sanitation due to overcrowding and difficulty to control and administer basic rules (International Prisons & Correctional Services Association-IPCSA, 2012).

A study carried out in the United Kingdom (UK) in 2006 revealed that the country had the highest rate of imprisonment in Western Europe estimated at 155 prisoners per 100,000 people irrespective of the fact that Europe is highly developed with relatively abundant resources to cater for such (Cavadino, 2006). Overcrowding has led to sanitation problems that conflict with human rights agreements in the United Kingdom with many prisons having decaying infrastructures below minimal standards leading to serious conditions where many prisoners were expected to “slop out” their chamber pans since they did not have twenty-four-hour access to a toilet facility (Cavadino, 2006). The United Nations (UN) observers in 2012 also noted that 70 percent of prisoners in Haiti prisons lacked basic hygiene and sanitation facilities. Thus, prisoners slept in shifts due to severe overcrowding, leading to serious sanitation and ventilation problems (IPCSA, 2012).

A report by Ombudsman (2012) on the general conditions in nine correctional facilities in Africa indicated that lack of good sanitation in overcrowded facilities led to death of inmates. Study also revealed that inmates in Makala prison in the Democratic Republic of Congo had no toilets and were forced to urinate and defecate on the floor (IPCS, 2012). An investigation by Omar (2012) indicated that overcrowding is the massive issue in Uganda Prisons where prisoners lie so tightly together in one room and that there was only one bucket in the corner of the room where everyone would use as a toilet. Prisoners were exposed to co infectious diseases like diarrhea, scabies and even tuberculosis (Omar, 2012).

Nigerian correctional facilities (Prisons) are faced with serious sewage management problems which has in turn, adversely affected the quality of sanitation and posed serious associated problems which can be linked to several years of neglect (Ogugua, 2018). For instance, Nigeria has invested so much in the establishment of new courts and police stations in the last two decades with very little or no attention at all in the expansion and improvement of facilities in correctional centres; this has in turn, resulted in over-congestion of prisons with inmates subjected to horrifying and dehumanizing conditions (Ogugua, 2018). This is exacerbated by the condemnation mentality rather than rehabilitation for criminal convicts.

Between 2007 and 2011, there were about 228 to 239 prison facilities in Nigeria with an increase in inmate population from 39,691 in 2007 to 75,261 in 2010 before declining to 49,451 in 2011 and later, increasing to 74, 059 in 2023 (National Human Development Report, 2015; Fatunmole, 2023). Given this large number of inmates confined in correctional facilities across the country, there are great concerns about the sanitary conditions of these facilities with particular attention on toilet facilities. Studies revealed that the most common sanitation challenges of correctional centres in most developing countries including Nigeria were over-filled soak-away pits, broken septic tanks oozing out faeces, inadequate toilet units, non-functional and highly dilapidated toilet systems and poor sewage treatment procedures (Kuo et al., 2016; Rojas-Valencia et al., 2017; Burrell et al., 2018; Boateng et al., 2019; Capodaglio et al., 2020).

The primary causes of morbidity and mortality among inmates in Nigerian correctional facilities include malnutrition, insanitary living conditions exacerbated by overcrowding (Ogugua, 2018). The prevalence of communicable diseases in correctional centres remains alarmingly high as those centres now serve as a reservoir for various kinds of infectious diseases with prisoners being frequently implicated in the spread of communicable diseases upon release back into their communities (Spaulding et al., 2019).

Sewage management refers to the sanitary collection, treatment and/or disposal of wastewater including faeces and urine generated by households, businesses and industries; effective sewage management is of utmost importance for safeguarding public health, protecting the environment, and promoting the overall well-being of communities (World Health Organization-WHO, 2018). Inadequate management of sewage can lead to the contamination of water sources, resulting in the

spread of harmful pathogens such as bacteria, viruses, and parasites and contributing to the proliferation of diseases such as cholera, typhoid, and diarrhea (WHO, 2018).

Sewage management conditions in correctional facilities within the study area are shrouded in high secrecy with very little or no documentation that can be useful to policy makers, donor agencies and prison administrators in order to improve the sanitary conditions of correctional centres and general wellbeing of inmates and staff members. It was in view of the above that this study investigated sewage management in correctional facilities and its potential public health implications in Rivers State.

### **Methods:**

The research design adopted for this study was the cross-sectional research design. A sample of 75 inmates who had spent at least, six (6) months in the correctional facilities was drawn from three selected facilities in Rivers State. The inmates included both those who had been convicted and those awaiting trial. A multi-staged sampling procedure consisting of purposive, proportionate and convenience sampling techniques was employed to arrive at the sample. The choice of this non-randomized method and sample size was due to the restricted peculiarities of the target population and environment. The instrument for data collection was a 17-item validated Sewage Management Correctional Facilities Public Health Implications Questionnaire (SMCFPHIQ) with a reliability index of 0.78 using Cronbach Alpha.

One (1) Officer working in each of the selected correctional facilities with unhindered access to the inmates who agreed to participate in the study were properly instructed and used as research assistants. The consent of respondents was sought and the wishes of those who declined were fully respected. The instrument was researcher-administered in order to minimize error and facilitate retrieval. Retrieved copies of the instrument were coded and analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. A Focus Group Discussion (FGD) was also conducted with three (3) selected Correctional Facility Officers who volunteered to participate in the study and their responses manually copied, paraphrased and read to their confirmation since they all objected to the use of any form of electronic recording or identification. Data were obtained and the results presented qualitatively. Descriptive statistics of percentage and frequencies were used and results obtained, presented in tables.

### **Results**

Table 1. Distribution of Respondents by Gender, Age and Period under Custody (N=75)

<b>Variable</b>	<b>Option (values)</b>	<b>Frequency</b>	<b>Percentage</b>
Gender	Male	66	88%
	Female	09	12%
Age	18-28	14	18.7%
	29-39	46	61.3%
	40-50	11	14.7%
	Above 50	04	5.3%
Period under Custody	6-11 months	17	22.6%
	1-3 years	32	42.7%
	4-5 years	18	24%
	6-8 years	06	8%
	Above 8 years	02	2.7%

Source: Field Survey, 2023

Table 1 revealed that a vast majority of the respondents were males (88%) while 12% were females. Again, respondents within ages 18-28 years were (18.7%), 29-39, (61.3%), 40-50, (14.7%) while those above 50 were (5.3%). Respondents under custody for a period of 6-11 months were 22.7%, 1-3 years (42.7%), 4-5 years (24%), 6-8 years (8%) while those above 8 years were 2.7%.

**Table 2:** Type of Sewage Facilities in Correctional Centres in Rivers State

Variable	Option (values)	Frequency	Percentage
Type of toilet available	Water closet	20	26.7%
	Pour flush	35	46.7%
	Pit latrine	05	6.7%
	Bucket latrine	07	9.3%
	Others (nylon/paper bag)	08	10.6%

Source: Field Survey, 2023

Table 2 indicated that a vast majority of the respondents (46.7%) use pour flush, 26.7%, (water closet), 14.2% (pit latrine), 6.4% (bucket latrine) and 3% (nylon/paper bags).

**Table 3:** Condition of Sewage Management Facilities in Correctional Centres, Rivers State

Variable	Frequency (percentage-%)			
	Always	Most times	Rarely	Never
Leakages from Septic tank	44 (58.7%)	21 (28%)	10 (13.3%)	0 (0%)
Odour nuisance from toilet	66 (88%)	5 (6.7%)	4 (5.3%)	0 (0%)
Regular water supply for flushing	0 (0%)	12 (16%)	15 (20%)	48 (64%)
Overflow of fecal matters inside toilet	51 (68%)	17 (22.7%)	5 (6.7%)	2 (2.6%)
Irregular power supply for pumping of water	66 (88%)	4 (5.3%)	5 (6.7%)	0 (0%)

Source: Field Survey, 2023

Table 3 revealed that leakages from septic tank occur in the following manner; always (58.7%), most times (28%), rarely (13.3%) and never (0%). Again, the statement on how odour nuisance is perceived was; always (88%), most times (6.7%), rarely (5.3%) and never (0%). On the issue of regular water to flush toilet, responses indicated that; always (0%), most times (16%), rarely (20%) and never (64%). On the overflow of fecal matters inside toilet, responses indicated that; always (68%), most times (22.7%), rarely (6.7%) and never (2.6%). Lastly, on the statement about irregular power supply for pumping of water, responses indicated the following; always (88%), most times (5.3%), rarely (6.7%) and never (0%).

**Table 4:** Compliance with Existing Sewage Management Regulations by Inmates in Rivers State

Statements	Frequency (percentages)			
	SD	D	A	SA
1. You only used designated toilets and latrines	63 (84%)	5 (6.7%)	5 (6.7%)	2 (2.6%)
2. You never defecate in open places	66 (88%)	5 (6.7%)	4 (5.3%)	0 (0%)
3. Septic tanks and soak-away pits are always maintained	50 (66.7%)	13 (17.3%)	12 (16%)	0 (0%)
4. You always wash hands thoroughly after using the toilet	41 (54.7%)	27 (36%)	5 (6.7%)	2 (2.6%)

Source: Field Survey, 2023

Table 4 revealed that majority of the respondents (84%) strongly disagree (SD) that they only use designated toilets and latrines, (6.7%) disagree (D), (6.7%) agree (A) while (2.6%) strongly agree

(SA). Again, majority of the respondents (88%) strongly disagree that they never defecate in open places (6.7%) disagree while (5.3%) agree. Furthermore, (66.7%) strongly disagree that septic tanks/soak-away pits are always maintained, (17.3%) disagree while (16%) agree. Lastly, (54.7%) strongly disagree that they always wash their hands thoroughly after using the toilet, (36%) disagree, (6.7%) agree while (2.6%) strongly agree.

Table 5: Perceived Challenges Affecting Effective Sewage Management in Correctional Centers in Rivers State

Variable	Option (values)	Frequency (N=233)	Percentage
Challenges affecting effective sewage management in correctional facilities	Poor maintenance culture	25	33.3%
	Lack of manpower	5	6.7%
	Lack of fund	4	5.3%
	Lack of basic equipment	11	14.7%
	Negative attitude of inmates	15	20%
	Corruption by Administrators	15	20%

Source: Field Survey, 2023

Results in table 1 revealed that the most commonly reported challenge was; poor maintenance culture (33.3%), followed by negative attitude of inmates and corruption by administrators with (20%) each and lack of basic equipment (14.7%), lack of manpower (6.7%) and lastly, lack of fund, (5.3%).

Table 6: Perceived Implications of Sewage Management Practices on Public Health in Correctional Centers in Rivers State

Variable	Frequency (percentages)			
	Always	Most times	Rarely	Never
Fly infestation	50 (66.7%)	20 (26.6%)	5 (6.7%)	0 (0%)
Odour Nuisance	56 (74.7%)	15 (20%)	4 (5.3%)	0 (0%)
Outbreak of Diarrheal-related Diseases	50 (66.7%)	20 (26.6%)	5 (6.7%)	0 (0%)
Rodent infestation	53 (70.7%)	15 (20%)	5 (6.7%)	2 (2.6%)
Unsanitliness	66 (88%)	5 (6.7%)	4 (5.3%)	0 (0%)

Source: Field Survey, 2023

Table 6 revealed that fly infestation occurred in the following manner; always (66.7%), most times (26.6%), rarely (6.7%) and never (0%). Again, odour nuisance had the following responses; always (74.7%), most times (20%), rarely (5.3%) and never (0%). On the issue of outbreak of diarrheal-related diseases, responses indicated as follows; always (66.7%), most times (26.6%), rarely (6.7%) and never (0%). On rodent infestation, responses indicated that; always (70.7%), most times (20%), rarely (6.7%) and never (2.6%). Lastly, on the statement about unsanitliness, responses indicated as follows; always (88%), most times (6.7%), rarely (5.3%) and never (0%).

### Discussion of findings

Findings from the study indicated that the most common type of sewage management facility in correctional centers in Rivers State was pour flush, followed by water closet. This supports the notion that pour flush systems are commonly employed in correctional facilities due to their relatively low cost of installation and management. One striking thing about the findings was the fact that the use of insanitary methods like pit latrine, bucket latrines and nylon/paper bags accounted for 23.6%. This is in line with similar studies conducted in some correctional facilities in developing countries (Balsamo, 2002; Smith et al., 2018). The implication of this to practice is that odour nuisance, fly

infestation; rodent infestation and open defecation will be regular occurrences in correctional facilities within the study area.

Again, results from the study revealed that the conditions of sewage management facilities in Correctional center were insanitary. For instance, there were always leakages from septic tank, odour nuisance, overflow of fecal matters inside toilet and irregular power supply for pumping of water. A study by Johnson *et al.* (2019) examining sewage management practices in correctional facilities in a neighboring state found similar high frequencies of odor nuisance and toilet leakage, indicating inadequate maintenance and management of sewage systems. The implication for this to practice is that inmates will be constantly exposed to insanitary conditions injurious to health. Apart from the high level of unsightliness, the conditions of sewage facilities are fertile for the spread of faeco-orally transmitted infections. There is therefore the need for improved maintenance practices, infrastructure upgrades, and awareness campaigns to improve adherence to sewage management guidelines in correctional facilities.

The study also revealed that there was poor compliance with existing sewage management regulations by inmates in correctional facilities in Rivers State. For instance, a vast majority of the respondents do not only use designated toilets but also defecate in open places. There was no serious attention given to the maintenance of septic tanks/soak-away pits and inmates do not have what it takes to always wash their hands thoroughly after using the toilet. This is in agreement with the findings of Anderson *et al.* (2017) who reported comparable findings regarding designated toilet use and the prohibition of open defecation.

Findings from the study indicated that poor maintenance culture, negative attitude of inmates and corruption by administrators were the most perceived challenges affecting effective sewage management in correctional centers. Brown *et al.* (2018) examined challenges in sewage management facilities in correctional centers across multiple states and identified similar challenges. This suggests that these challenges are systemic in correctional centers in Nigeria. Findings from the study also indicated that fly infestation, odour nuisance, outbreak of diarrheal-related diseases, rodent infestation and unsightliness were the perceived public health implications of sewage management practices in correctional centres in Rivers State. This is in line with the findings of previous studies (Roberts *et al.*, 2019). The implication of this to practice is that inmates will be vulnerable to associated diseases which will make their stay in the correctional facilities very unsafe.

All the findings above were corroborated by the outcome of the FGD with correctional facility officers. The conditions of toilet facilities across our prisons in the State are in a big mess; they cause more harm to the inmates resulting to different kinds of diseases, one of the participants stated. All the W/Cs are either damaged or constantly overflowing with faeces, no water to flush toilets, most of the connecting pipes in the toilets are badly damaged with broken septic tanks another participant stated. From the above, it is therefore evident that the state of sewage management in correctional facilities in Rivers State is insanitary and may pose significant public health challenges on both inmates and members of staff.

It is thus, recommended that all stakeholders in this sector, especially the government must be more intentional to improve the health of inmates by improving their sewage management facilities through adequate funding, improved infrastructure and personnel, regular awareness campaigns and effective supervision to ensure that funds tied to projects are judiciously utilized.

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