



## **THE DANGER OF MISMANAGING DISPOSABLE BABY DIAPERS IN RESIDENTIAL ENVIRONMENTS: A CASE STUDY**

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### **Abstract**

This study discusses the danger of mismanaging disposable baby diapers (hereinafter referred to as diapers) in residential environments. The random disposal of soiled baby diapers harbour communicable disease diarrhea and typhoid which may cause death of many young children. Disposable baby diapers are often found carelessly thrown away in many residential areas. Some components of diapers include toxic chemicals which are dangerous because they may kill micro-organisms, plants and animals which consume them. Some also clog the soil causing water loss through run-off, floods and destruction in gardens and fields. A qualitative research design was followed. Data was gathered through observation and interviews with nappy users (mothers and nannies). The findings indicated that rural communities lack designated disposal area for diapers. The study recommends that national government could develop policies which restricts to production of biodegradable, non-toxic and or recyclable diapers. It further recommends that local municipalities could use by-laws to enforce and monitor manufacturing compliance.

**Keywords:** *Disposable Baby Diaper, Health Risk, Land Pollution, Environmental Hazard, Water Contamination*

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### **1. INTRODUCTION**

The use and management of disposable baby diapers (hereinafter referred to as diapers) is time immemorial globally. It has taken different forms depending on the people and their cultures (Krafchik 2016; Unsustainable Magazine, 2020). Most caregivers and parents globally use diapers for babies because of their convenience. According to Sustainable (2020), about four million babies are born annually in the United States of America (USA). Each uses about 2500 diapers in their first year. That means Americans dispose around a trillion diapers annually from babies under one-year-old. There were over four million tons of used diapers with about eighty percent thereof disposed in the USA landfills in 2017. According to Felter, Carr, Zhu, Kirsch, and Niu's (2017) study, they reported that almost 21 billion diapers were consumed annually in the European Union. According to Green Building Council South Africa (2018), the impact of disposing diapers on the environment is devastating. About 3.5 billion were registered on landfills in 2018.

There're different types of diapers, namely, biodegradable, and non- biodegradable diapers. The former is made from plant material and more expensive. The latter is made of synthetic materials and cheaper. Chemicals like dioxin, a carcinogenic chemical and hazardous byproduct of the bleaching process for paper, toxic chemicals related to cancer in leak-proof polymers, highly absorbent polymers, and certain scented chemicals are among them. (Sustainable 2020). That makes it pose several potential dangers including environmental pollution. They spread bacteria to the environment. However, most caregivers and parents use and dispose of them without considering that danger to the environment. This article explored the danger of mismanaging diapers in a residential area in South Africa (SA). A qualitative research method was used. Data was collected, analyzed, and interpreted. Findings and recommendations were made.

### **2. LITERATURE REVIEW**

Mismanaging diapers leads to environmental pollution. The latter is introducing harmful pollutants - which may be either in the air (gaseous), water (liquid), or on land (solid) - into the environment and (in)directly pose a threat to people's health and other living organisms' (Ntekpe,

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Mbong, Edem and Hussain 2020; Manisalidis, Stavropoulou, Stavropoulos & Bezirtzoglou 2020). They contribute significantly to worldwide environmental pollution (Ziraba, Haregu and Mberu 2016; Ukaogo, Ewuzie, Onwuka, 2020). SA has been characterised by forever increased waste generation and mismanagement. It's exacerbated by uncontrolled population increase (Department of Environmental Affairs, 2012). De Beer, Dreyer and Loubser (2014) assert that SA dumps solid waste on open land and in landfill sites. Villagers don't have designated landfill sites and dump on open sites. Most urban residents have designated landfill sites for dumping waste. However, the inconsistent collection of waste by municipality officials, high human population and filled landfills lead to dumping waste including diapers illegally on open sites (own observation).

Although diapers keep babies dry and comfortable, they're also convenient for employed parents and those villagers where water is scarce, they (disposable baby diapers) pose a threat to the environment where they are disposed. This is despite environmental impacting factors e.g., getting raw materials like electricity, water, pulp, cotton, plastics, production steps, harmful chemical releasing sodium polyacrylate, chlorine, PCDDs, TBT into the air, finishing and disposal procedure (Makoś-Chelstowska, Kurowska-Susdorf, & Płotka-Wasyłka 2021). Several studies reported that diapers are trash and harmful if they're not properly managed (Colón, Ruggieri, Sánchez, González, and Puig 2011; Meseldzija, Poznanovic & Frank, 2013). They contaminate, land, water, and food production chain. Most diapers that are made of plastic, super-absorbance gel and other components are found at landfills and biodegrade years after exposure to air and sunlight. The same happens to those labelled "eco-friendly" and "biodegradable" (Colón, et.al. 2011).

Throwing used diapers on landfills without firstly clearing waste into toilets is another environmental problem. According to Ali, Taib, Soon, and Hassan's (2017) study a baby may use between 5000 to 7500 diapers during baby nappy wearing period. They observed that none of the used diapers had decomposed on landfills after some time. They estimated a diaper could take up to 500 years to decompose. That makes it important for parents to throw baby's faeces down the toilet before they dispose disposable baby diaper. Ali, et.al. (2017) assert that faeceseed diapers contain harmful viruses and microbes which can pollute water by diffusing into river, dams and even groundwater. As carriers of pathogens and parasites, excrement is a breeding ground for different viruses, including Hepatitis B and polio. Unattended and exposed diapers attract flies, rats, and other animals that spread diseases and cause intestinal illnesses like gastroenteritis, E. coli, and worms. Added to that could be the spread of communicable diseases e.g., campylobacteriosis, typhoid fever, hepatitis E, cryptosporidiosis, and schistosomiasis when disposed of on landfills (Huber et al., 1994; Sclar, Penakalapti, Amato, Garn, Alexander, Freeman, Boisson, Medlicott, Clasen, 2016; Kordecki, Antrobus-Wuth, Uys, van Wyk, Root, Berrian, 2022). That is why diaper packages have printed instructions for caregivers and parents to rinse diapers and flush the faecal material down the toilet before they put it into the trash. Those instructions seem to be rarely followed (own observation).

Almost one million babies are born annually in SA (StatsSA, 2020). Each uses approximately 1000kg of diapers annually. Therefore, in 2 years, each baby would have used more than 2000kg. This leads to considering the quantity, space, and weight of used diapers produced by one million babies annually, in a decade and more (Sustainable 2020). Most urban residents dispose diapers in designated areas and villagers use open fields which may be dry or swampy or even wet. Some diapers are dumped at the dams, riverbanks, etc. and pollute communal water source(s). That causes major health risks to communities which do not have municipality provided piped water and rely on dams, ground water, rivers, streams, etc. for supply (2020). Chlorofluorocarbons that destroy the ozone layer are generated when diapers are disposed off in landfills. By absorbing solar radiation and keeping it from reaching the surface, ozone acts as the earth's shield. It absorbs ultraviolet (UV) radiation, which have been connected to skin cancer, cataracts, and can be harmful to various crops and marine life (Parker, 2021). Another problem of disposing diapers on landfills is that as they decompose slowly and release methane into the air. The latter is a green-house gas that replaces oxygen and which, from billions disposed diapers, add to global warming. The disposal of diapers in landfills slowly threatens the ozone layer (Parker,



2021; Ndlovu and Naidoo, 2022). Having reviewed literature on diapers and their impact to the environment if mismanaged, hereunder is a description of the research site of this article.

### **3. IMPLEMENTATION METHOD**

#### **3.1. Research site**

The study was conducted at Dukuduku Village in St Lucia area, under Inkosi Mtubatuba Municipality in KwaZulu-Natal. The St Lucia region, which is rich in agriculture and industrial forestry, is located on KwaZulu-Natal's east coast. It is also one of the primary access points to the iSimangaliso Wetland Park, South Africa's first World Heritage Site. (Nustad, 2020). The word "iSimangaliso" means a 'place of Miracle and Wonder'. Isimangaliso Wetland Park is a huge, protected area with Lake St. Lucia as its centrepiece and a homage to hippos, crocodiles, pelicans, and flamingos. There are also antelopes, baboons, elephants, giraffes, and leopards in the park's grasslands and forests. To the north is Sodwana Bay which has colourful coral reefs (UNESCO, 1999). Dukuduku Village is characterised by socio economic factors such as high unemployment rate, poverty and lowest levels of literacy (Van Rooyen, 2007).

#### **3.2. Sampling procedure**

Research sample comprised of ten mothers and ten nannies who were purposively sampled because they have knowledge and experience of using disposable baby diapers. The sampling process was designed with the expectation that a sampled population of mothers and nannies would provide thorough and varied information about their knowledge and experiences (Nomatshila, Apalata, & Mabunda, 2022).

#### **3.3. Data collection procedure**

A qualitative research methodology was used for gathering data. Ten residents who use diapers for their babies volunteered to be interviewed and observed to gather data. Ten other residents (nannies) who don't have babies but using diapers also agreed to be interviewed. Interviews focused on eliciting narrative data that allowed researchers to explore respondents' views (Monday, 2020). All interviews were conducted in IsiZulu, the main local language. The interviews were audio-recorded transcribed verbatim and translated into English by someone other than the interviewee. Authors sought permission to audio record the proceedings of the interviews and it was granted. An unobtrusive observation in the form of physical trace analysis was conducted. Observations enabled researchers to describe respondents and sites using four senses, namely, feeling, sight, smell, and touch. Field notes were taken from participants' setting, purpose, their social behaviour, the frequency and duration of phenomena as well as taking pictures of the site for data analysis, interpretation, and discussion.

#### **3.4. Data analysis, interpretation, and discussion**

Data were analyzed, interpreted, and discussed through Colaizzi's seven-step descriptive phenomenological method of data analysis and interpretation (Colaizzi 1978). The researchers firstly read all respondents' gathered data to familiarize themselves with it. They identified and gave meaning to all relevant phenomenon that arise. They avoided influencing data by remaining objective. The researchers identified and clustered all themes (statements they regarded as important and relevant) then gave meaning to them. All themes were used to analyse and interpret data (Colaizzi 1978; Morrow 2013; Morrow, Rodriguez, and King 2014). Some respondents were quoted verbatim to avoid influencing them. Researchers then briefly recorded every statement to capture its essence. Relevant sources were referred to wherever there was need. Lastly, researchers reviewed all data to ensure and justify reliability and validity (1978).

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**4. RESULTS AND DISCUSSION**

participants prefer to use disposable diapers because they are convenient as they are single used and disposed. It is time and energy saving and cheaper, compared to reusable cloth napkins which are time consuming and expensive. Washing involves the use of water, washing powder and electricity and one has to spend hours doing washing and waiting for it to dry. It was revealed that the number of disposable diapers used for each baby a day depend on the age and feeding. Young babies use an average of eight to ten disposable diapers each day, since, they are fed mostly liquids. Whereas older babies use an average of four to six diapers per day amid they are fed much of solid foods (Thaman, Eichenfield, 2014). Based on Colaizzi's (1978) method of data analysis and interpretation, it emerged that used diapers were disposed in different ways. Some participants discarded diapers in open fields and create enormous trash (Parker, 2021).

**Fig. 1. Freshly disposed soiled diapers**



Figure 1 and 2 depicts soiled diapers indiscriminately thrown away or dumped openly on various points such as bushes, road sides and river banks (Ntekpe, Mbong, Edem & Hussain, 2020). Some seemed to have been recently thrown while others looked as having been lying there for years, (figure 2).

**Fig. 2. More than 5 years disposed diapers**





One respondent said: “They look like wildflowers wherever you find them”. When participants were asked why do they discard soiled diapers on open fields. The reason given was that there were no designated areas (landfills) for dumping soiled diapers. There is no proper plan for solid waste management at Dukuduku Village. Farm animals such as chickens, dogs, pigs, birds, and other vermin delve over discarded soiled diapers on land and open waste piles in search of food (Doron 2021). Thereby harbouring harmful pathogens which cause diseases. The most puzzling effect of disposable diapers on the environment may be the formation of solid garbage, of which they are said to be the third largest individual component in municipal solid waste, behind only bottles and newspapers, which make up 1.5% and 4% of the total (Cook, Bloom, Halbach, 1997 & World Health Organisation, 2016). Since, solid waste is not collected, some has resolved in burying down soiled disposable diapers in their home yards or open grounds. Some participants stated that they request their husbands to excavate trenches to burry soiled disposable diapers. “My husband helps me by digging a pit for putting diapers”. We dug some diapers which were buried three years ago, they were still not decomposed.

This indicates that diapers are not easily biodegrade in the soil amid some manufactures claim that their diapers biodegradable. The study discovered that claims about a product's biodegradability or composability are fabricated to entice consumers and provide the impression that it is distinct from competing products; as a result, these claims are blatantly false (United Nations Environment Programme, UNEP, 2023). Disposable diapers can be buried or dumped carelessly, but this has the unintended consequence of combining with groundwater and contaminating drinking water with bacteria, viruses, protozoa, and helminths (Kordecki, Antrobus-Wuth, Uys, van Wyk, Root & Berrian, 2022). This is even though it is less obvious to locals. Many of these infections are zoonotic, meaning they can contaminate food and water. This indicates that they are transferrable from humans to animals. In a sequential manner, these harmful bacteria, protozoa, helminths, and viruses propagate infectious diseases like cholera, giardiasis, amoebiasis, and typhoid. Buried diapers may block the soil pores, water-logging the soil and causing water loss through run-off, floods and destruction in gardens and fields. Water runoff and floods wipe out organic matter, nutrients, sediments, and pesticides to rivers and lakes where they harm natural aquatic species (Sagasta, Zadeh, Turrall, & Burke, 2017).

Some diapers were also found disposed on the banks of the river and contaminating water and posing a threat to aquatic life and potentially impacting human health when drinking such contaminated water (Chełstowska, Susdorf & Wasylka (2021). Other informants told us that they burn soiled disposable diapers, although they (soiled disposable diapers) burn with difficult. “I burn soiled disposable diapers even though they do not burn completely.” We also observed incomplete burnt soiled diapers as shown in figure 2. Disposable diapers are extremely difficult to burn because of their jelly-like material and wet state from being soiled with pee and excrement (Remigious, 2014). Burning soiled disposable diapers also create enormous air pollution. The remnants of burnt disposable soiled diapers also pose a problem since they cannot be decomposed and create unattractive environments. Instead burning of soiled plastic diapers emit dioxins, toxic fumes that have health hazard to human, animals and environment as such (United Nations Environment Programme (UNEP, 2023).

## 5. CONCLUSION

Participants had a vast knowledge about the benefits of using baby disposable diapers and very little is known about the dangers of disposing baby diapers indiscriminately on the environment. Awareness of the dangers posed by improper disposal of soiled baby diapers is crucial and must be prioritised. Encourage mothers, fathers and nannies are encouraged to consider environmentally friendly alternative such as compostable diapers or reusable cloth diapers and educating. It is recommended that the national government develop regulations requiring nappy makers to use recyclable, non-toxic, or biodegradable materials. Indiscriminate nappy disposal is a global health concern that has to be addressed immediately since it affects the health of people, animals, plants and ecosystems. Therefore, local municipalities need to designate areas to dispose

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used diapers in rural areas. Local municipalities could craft by-laws to enforce compliance and monitoring manufacturing and disposal of recyclable diapers. The government could also purchase used disposable diapers

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