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Practices Regarding Disposal of Soiled Diapers among Women of Child Bearing Age in Poor Resource Urban Setting

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Abstract : *Managing diapers waste is one of the most rapidly growing pollution problems worldwide. This paper looks at practices regarding disposal of soiled diapers as a way of promoting a healthy environment in communities. Quantitative research design was used to guide the study. Self-administered questionnaires about diaper choices and practices were completed by 60 randomly selected mothers of children younger than two years of age. Descriptive and inferential statistics were used to analyze data. The major finding of the research was that most (78%) women used disposal diapers and the reasons cited were convenience (70%) and cost (75%). Considering that 91% threw used diapers in refuse bins and 51% reported erratic collection of refuse leading to littering of waste, the study recommends the City council refuse collection Department to improve refuse collection. Health promotion awareness on proper disposal of diapers to the public should be intensified through the media and during social gatherings.*

Keywords: *diapers, knowledge, practice, waste disposal***.**

I. Introduction And Background

Waste management problem has increased at an alarming rate worldwide. Solid waste is piling up fast as the population increases. Managing diapers waste is one of the most rapidly growing pollution problems worldwide. Safe disposal of excreta is essential for ensuring a healthy environment and for protecting the public. Developed countries exercise the best management practices in waste handling and disposal while the less developed countries like Zimbabwe, generally lack adequate means to handle and dispose of many wastes in an environmentally safe manner. In Zimbabwe, as in many developing countries, it appears that little information is available regarding handling and the proper disposal of disposable diapers despite a significant rise in usage of such during the last decade by women of child bearing age. Proper disposal of diapers reduces incidences of contamination of drainage water, which can subsequently lead to diarrheal diseases. According (1), non-renewable energy, global warming, and respiratory effects from in organics are the most relevant of the potential environmental impacts for the diapers.

The promotion of hygienic behaviors has been identified as a public health intervention likely to have considerable impact in the reduction of diarrheal diseases in young children in developing countries. It is generally regarded that waste management is the sole duty and responsibility of local authorities, and that the public is not expected to contribute (2). Contrary to this statement, there is need for community involvement and participation in decisions regarding proper disposal of waste material to maintain a health and safe environment. There is limited literature on the proper disposal of soiled diapers in households. Therefore, the study aims at identifying current practices regarding soiled diaper disposal and to recommend interventions that could improve the disposal of soiled diapers at the household level. The results of this study may be used by policy makers to come up with policies and guidelines on proper disposal of soiled diapers to reduce contamination and environmental hazards.

II. Literature Review

The review will focus on a brief history of diapers and practices regarding disposal of diapers, looking at the proper and improper practices. Literature on the environmental and health impacts of poor disposal of diapers and cloth diapers was also reviewed. To complete the review, suggested alternatives are highlighted.

1.1. History of Diapers

The need for diapers has been around since the beginning of history. Throughout the ages, people have created their own versions of diapers using natural resources such as milkweed leaf, animal skins, packed grass and moss (3). In colder regions, infants were often bound up in blankets that kept them warm and acted as primitive diapers (3), while in warmer tropical climates, diapers were rarely used instead mothers tried to anticipate their baby's bowel movements and took them outside away from the house to avoid messes. It wasn't until the mid nineteenth century with the advent of cheap manufactured cotton fabrics that cloth diapers began to emerge. Some women would place natural absorbing materials such as moss or peat inside the diapers to help

collect waste and some would simply put two or more diapers on their child to limit leakage. According to (4), the need for disposable diapers came during World War 11 because there was shortage of cotton to make cotton diapers. Literature attributes the invention of disposable diapers to trial and error by many researchers. However, Marion Donovan is credited for inventing the first plastic covering for traditional cloth diapers, by using plastic covering made from plastic shower curtain and layers of tissue as an absorbent material (4).In the 1960s, pulp was used to replace paper. During the early 1980s, starch was added to enhance the disposable diapers' biodegradable properties (4). Over the years many improvements have been made to the disposable diapers. Currently the disposable diapers contain cellulose mixed with crystals of polyacrylate (4). The advantages of polyacrylate reduces the weight and thickness of the disposable diapers and also increases its absorbent (4).

1.2. Disposable diapers

Disposable diapers are made up of synthetic materials which are designed to allow them to absorb and retain urine and feaces. According to (5), disposable diaper consists of:

- A liquid –permeable membrane lining the inside surface made of non-woven polymer
- A water tight membrane on the outer surface made from polymers, starch-woven cloth or rubber,
- An absorbent core (pulp fluff) made up of a fibrous material enclosed in water resistant paper. The fibrous material can be cellulose, hemp or synthetic materials.
- The absorbent part also contains a super- absorbent polymer material of sodium polycrylates which has a high capacity for bonding with water, making it possible to retain urine within the absorbent part.
- Disposable diaper also contains miner amounts of tapes, elastics and adhesive material.

In just a few years after commercialization, disposables virtually replaced traditional cloth diapers as consumers recognized and valued overwhelming advantages in ease of use, increased comfort and better hygiene (3). In a study done in Ottawa, Canada, disposable diapers were used by 82.3% parents and only 2 % used cloth diapers (6). Reasons for using disposable diapers were mainly low cost, convenience, better fit, greater absorbency and thinness. In another study in Kenya, women preferred using disposable baby diapers over cotton diapers because disposable diapers were not affected by cloudy and rainy conditions (7). Unfortunately the rise in demand has created disposal problems. According to (5), disposable diapers generate more than 7 times waste than cloth diapers.

1.3. Practices regarding disposal of disposable diapers

There is very little literature on disposable diapers practices and on how soiled diapers should be disposed. In developing countries, most households dispose diapers with household waste or in landfills or incinerate them. The norm is that the diaper should be cleaned and the soils drained down the toilet (8), yet untreated feces and urine are being thrown away when soiled diapers are being disposed of (5). (6) reports that in Canada, diapers are not collected separately and are disposed as solid municipal waste with the majority ending in landfills or incineration, composting or anaerobic digestion. People in areas where waste collection is poor, residents tend to improvise by using plastic bags for storing their waste which include soiled diapers and then dump these in open spaces near their houses where they become part of the municipal solid waste stream (9). In Zimbabwe, diapers are disposed at illegal damp sites (10; 11).

1.4. Practices regarding disposal of cloth diapers

Cloth diapers are made from mostly renewable resources like cotton, bamboo and hemp (12), and are absorbent and environmentally friendly. There are soft on the baby's skin and able to absorb any mess (12). Though cloth diapers are durable, when laundered cloth diapers uses 77% more water than disposable diapers (5). After washing cloth diapers, waste water is either discarded in the household soil or nearby yard, or in a latrine or toilet facility. Human feces can leach causing contamination to ground water. Studies in Peru have noted that mothers do not consider water mixed with baby's feces contaminated as they believe that baby's feces are not dirty (13).

1.5. Health impacts of poor disposal of diapers

The most obvious impact of disposable diapers on the environment is that, in developing countries, where there is inadequate supply of waste containers the probability of waste being dumped in open areas and roadsides is high. Insufficient financial resources in developing countries hamper the safe disposal of waste in well equipped and engineered landfills (14). Dumping of used diapers at illegal open dump sites has been reported to expose communities to diarrheal diseases and obnoxious odours (15). Air pollution from the manufacturer of disposable is far more noxious than the air pollution from production and use of cloth diapers (12). They further noted that chemicals such as sodium polyacrylate, chlorine, dioxine TBT are also released

into the air. According to (16), exposure to sodium polyacrylate dust may cause respiratory tract and lung irritation, aggravating existing respiratory conditions.

While most disposable diapers can decompose within five months, as they are products of wood or cotton, the super absorbent gel and the plastic products in them takes longer to decompose and need at least 500 years to decompose (5). Another impact is that when soiled disposable diapers are discarded along with untreated urine and faces in landfills, these can leach causing contamination and spread of communicable diseases (17). Landfills can also be breeding ground for viruses like Hepatitis B and parasites (12). Methane can also be emitted when biodegradable wastes are discarded in landfills (18). Methane is a green house gas that replaces oxygen in the atmosphere contributing to global warming (12). Methane from landfills represents 12% of total global methane emissions (19). Environmental Agency estimates that disposable diapers are responsible for 630kg of green house gas (5) and built up of methane gas can cause explosions or asphyxiation (20).

While incineration has the capability of destroying hazardous components of waste and of reducing waste volume by leaving only ash,, the air impurities associated with burning the waste causes environmental pollution (17). Dioxin and furan are two of the most hazardous toxins produced when incomplete combustion takes place (21). Green house gases, chlorine and carbon monoxide are also produced when diapers are incinerated (18). The greatest health risk from open burning of garbage at a waste disposal ground is inhalation of smoke and odour. The ash which may be dispersed by the wind or leached by the water may contain toxic contaminates, which may be inhaled leading to respiratory problems. Toxins may be leached from remaining ash which could lead to the contamination of surface water or ground water (20). The pollutants are all toxic to humans, depending on their concentration and may cause skin irritation, respiratory problems and some cancers. Individuals with respiratory problems or allergies are aggravated by the smoke (20). (21), reported that most parents are not aware of the adverse effects of disposable diapers being in contact with the baby's reproductive organs 24 hours a day for the duration it is used and the long term effects it causes to the environment. The related health problems that are raised include cancers, kidney and liver damage, skin diseases and respiratory problems.

The non collection of refuse has encouraged people to bury waste such as diapers in the ground. This however has devastating effects on water supplies as through seepage, waste will eventually mix with underground water and the probability of contaminating the source of drinking water by pathogens such as bacteria and viruses is very high (22; 23). Results from Kenya, showed that some residents in Kenya, flush used disposable diapers resulting in sewer blockage (7). Managing waste effectively becomes an increasingly important challenge to modern society.

1.6. Alternative diaper disposal methods

Review of literature has revealed a number of alternatives that developing countries are using to ensure proper management of waste from disposable diapers, and with proper planning authorities in developing countries can adopt them (24), highlighted the following alternatives:

- Mechanical biological treatment
- Mechanical separation and recycling of the different fractions. This method involves separation of the different recyclable fractions included in diapers and these include organic matter, plastics, cellulose. The diapers are collected separately and transported to a treatment plant. At the treatment plant the diapers are shredded, washed and their components are separated.
- Anaerobic digestion of waste with a high content of organic matter, such as kitchen waste, food packaging and diapers. With this method the resulting digested matter is treated by an aerobic process, where it is transformed into compost.
- Composting- is done to reduce the amount of waste in dump sites and landfills. A study done in Japan (21), to confirm the decomposition ability of micro-organisms, revealed that the natural disposal method of decomposing disposable diapers using micro-organisms of wood origin is useful.

III. Methodology

The study sought to establish practice regarding disposal of diapers at household level. The study used quantitative research design. The sites were chosen due to convenience. Self-administered questionnaires about diaper choices and practices were completed by 60 randomly selected mothers of children younger than two years of age. The study was carried out in two high density suburbs. Descriptive and inferential statistics were used to analyze data. The questionnaire was translated to Shona from English Language. Verbal consent was obtained from the participants. Confidentiality was assured and maintained throughout the study. Descriptive statistics were used to analyze gathered data.

IV. Findings and discussions

Most (78%) of the participants used disposable diapers compared to only 18% who used cloth diapers, citing cost, convenience and easy to use as the major reasons (Table 1 and 2). These results are consistent with findings in Canada (25).

Table 1: Diaper choices and reasons N= 60

Variable	**Frequency (n)**	**Percentage (%)**
Types of Diapers used		
Cloth	11	18
Disposable	47	78
Both	2	4

Table 2: Reasons for using Disposable diapers

N >49 (because those who use disposal diapers cited more than one reasons)

Variable	Frequency (n)	Percentage (%)
Cheap	35	75
Convenience	33	70
Easy to Use	16	34
Comfort	3	6

Table 3: Reasons for Using cloth Diapers

N>13 (because those who use cloth diapers cited more than one response**)**

Variable	**Frequency (n)**	**Percentage (%)**
Reusable	8	73
Durable	3	27

The majority 43 (91%) indicated that they wrapped the diapers in papers and dispose in refuse bins. About 19 (40%) burnt the disposable diapers after use. Only 2 (4%), used pits. This result challenges the local authority to provide refuse collection bins consistently to avoid littering. Residual water from washing cloth diapers was flushed in the toilet. This is commendable as the contaminated water follows the normal drainage route. Challenges faced with proper disposal of diapers, were cited as erratic refuse collection which lead to littering, absence of communal designated disposal area for soiled diapers and lack of knowledge on proper disposal practices. (14), agrees that, refuse collection in urban areas is erratic with most of it remaining uncollected, especially in the high density areas. Though cloth diapers are durable and can be reused, consistent with literature, use of cloth diapers was affected by the inconvenience they cause, especially during rainy season when they take longer time to dry. To improve disposal of diapers, participants suggested the following:

- responsibility authority to designate special bins for disposal diapers and incinerating point,
- marketers to insert disposable plastic papers inside the diapers,
- regular refuse collection,
- health promotion awareness on proper disposal of diapers
- Manufacturers to include information leaflets in diapers packs on proper disposal of disposal diapers,

On the basis of the above findings, the following strategies are recommended:

- To keep abreast with current trends in waste management, the local authorities should invest in resources to promote proper disposal of refuse.
- Manufacturers of disposal diapers to insert information leaflets in diaper packets with clear instructions on how to dispose
- Diaper waste disposal awareness campaigns should be carried out in tandem with Family Health Care Services at Clinics and social gathering so that maximum numbers of mothers are reached.
- Communities to be empowered through Community Based Organization to manage their own refuse instead of relying on the local authorities, who are facing financial constraints.

V. Conclusion

While this study confirms the popularity of the disposable diapers health concerns pose major problems.. Diapers do not degrade and when incinerated gases from the plastics are released into the air. The most obvious impact of disposable diapers on the environment is that they are thrown away pilling up garbage every day. Awareness on proper disposal of diapers is the most practical strategy that can be used to manage refuse disposal.

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