Recycling Method of Solid Waste Management Practice in Public Secondary Schools in Katagum Zonal Area of Bauchi State

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Abstract
This study investigated recycling method of solid waste management practice in public secondary schools in Katagum Zonal Area, of Bauchi State. The overall objective of this study was to find out recycling method of solid waste management practice in public secondary schools in Katagum zonal area of Bauchi state. One research question, one Hypothesis were formulated. A descriptive survey research design method was used in this study. The population for the study comprised the entire public secondary schools in Katagum zonal area of Bauchi state with a population of eighteen thousand, five hundred and ninety five (18,595). The sample size used for this study was three hundred and seventy seven (377) respondents. The researcher used simple random sampling technique to select three local governments in Katagum zonal area of Bauchi state. Six public secondary schools were selected from the three (3) selected local Governments in Katagum zonal area of Bauchi state. Data collection instrument was researcher developed questionnaire; duly validated by the expert of Health Education and a reliability index of 0.84. Out of three hundred and seventy seven questionnaires that were administered, three hundred and forty nine were duly completed and returned for analysis. Percentage/count was used to organize and described the demographic characteristics of the respondents; chi-square was used to test the Hypothesis at significant level of 0.05. The findings for this study revealed that, public secondary schools in Katagum zonal area of Bauchi state significantly practice recycling method of solid waste management in their schools. It was recommended among other things that government should provide more training of public secondary schools on the use of common recycling method.

Key Words: Recycling, Solid waste, Public schools, Katagum zone

Introduction
Recycling is a resource recovery practice that refers to the collection and reuse of waste materials such as empty beverages containers, reprocessed into new product. Materials for recycling may be collected separately from general waste using decanted bins and collection vehicles after they have been sorted directly from mixed waste streams known as Kerb-side. Recycling method is used to provide assistance to school districts in establishing and implementing source reduction and recycling programs. This re-use items includes such as beverage cans, copper, such as wires, steel food and aerosol cans, polyethylene, glass bottles and jars, paper board cartons, newspapers.

The type of material accepted for recycling varies by city and country a survey of school districts on their level of program implementation, development of solid waste reduction
Recycle in schools provide assistance to school districts in establishing and implementing source reduction and recycling programs. This assistance includes a survey of school districts on their level of program implementation, development of a model waste reduction program, training and ongoing technical and informational assistance, and information on programs for other states and institutions. Solid waste reduction as part of the school district's overall way of doing can provide a number of important benefits: (Reduced disposal costs, improved worker safety, reduced long-term liability, Increased efficiency of school operations, Decreased associated purchasing costs. The school classroom is an ideal place to put recycling practices into a day-to-day curriculum that covers topics that include ecology, biology, economics, chemistry, mathematics, social studies and more. Students will not only learn the benefits of recycling and sustainable living practices, but will make a practical contribution to the reduction of waste that the school is paying to have removed. Additionally, students will tend to take these practices home and share them with family members, adding to the benefits the classroom learning experience. School district waste reduction programs also foster student achievement by transforming the school environment into a laboratory for learning and providing numerous opportunities for investigation through integrated Solid Waste Management Act requires that all counties reduce solid waste disposal by 50 percent. School districts can play a critical role in a city or county's ability to realize this goal (Mesgarof, 2013).

Within the Classroom: There are many programs that can be instituted in the classroom. Starting at the primary grades, paper recycling is the most common and easiest way to instill the basic recycling practice. Your school waste hauler should offer separate bins to collect both white bond paper and other types of paper. (It's a good idea to advise the janitorial staff that these bins are for recycling) Classrooms can compete to see which one recycles the most paper per student (Amini and Ramazani, 2012).

Outside the Classroom and School: there are many more ways to recycle outside the classroom. The primary focus on school wide recycling should start at the cafeteria. The cafeteria/lunch room can be responsible for over 70% of your schools waste production. Cardboard recycling is the easiest and most beneficial way to reduce kitchen waste. Utilizing a cardboard recycling bin can cut disposal costs by a third. After cardboard, the usual items such as metal cans, plastic bottles and cartons, and paper products can be recycled in a standard comingled recycling bin. If beverage containers are sold at your school, bottle and can recycling is a great way to not only reduce waste but make money for school activities. Beverage container receptacles should be placed where the students purchase and consume the drinks like: Snack bars, gyms, stadiums) (Mesgarof, 2013). Some of the more popular recyclable items that usually have a reasonably accessible market are listed below. These products are a significant percentage (50%+) of the solid Waste package: (Newsprint, computer paper, cardboard; Glass designate clear or colored and any divisions of colored; Plastics determine what forms of plastics will be accepted or post the stamped standard recycle number(s) displayed on the plastic items that will be taken by the facility; and Metals once again a decision needs to be made addressing the types received, such as tin, aluminum, etcetera). Some recycling programmes may declare a profit, but many programmes managers find that such programmes generate only a small amount of funds. Most would report that the project may be a break-even” effort with the gain being a
savings on the landfill’s lifetime. Additional considerations that communities must address are zoning and land use, including settings, permits, ordinances, general business regulations, and contacts. All new recycling programmes involve major changes in the way citizens handle waste; therefore, a start-up plan is a must. Boards of health must take an active role in implementing short- and long-term programs that incorporate public understanding, participation, and acceptance or support. In addition, citizens and local officials must be constantly reminded of the environmental, economic, and social reasons for reducing landfill (Shobeir, 2007).

**METHODOLGY**

Descriptive research survey design was used for the study; the design is suitable to gathers information for the study, for the purpose of describing study variables. The population for this study comprises all public secondary schools in Katagum zonal area of Bauchi state, Nigeria, with an estimated population of 18,595 in thirty six (36) schools of the seven (7) local governments of Katagum zone, Bauchi state. The sample was selected using Krejcie and Morgan in their table for “Determining Sample Size for Research Activities. The selected sample size for the purpose of this study was three Hundred and seventy seven (377). Since the population of this study was 18,595. Simple random sampling method was used to select three (3) Local Government Areas out of the seven (7) Local governments in the study area.

The sample for this study was three hundred and seventy seven (377) respondents of public secondary schools in Katagum zone out of the total population. This means that two secondary schools were selected randomly from each Local Government, one from rural and another from urban locality. This was achieved through using slips of paper and the representative of the local governments were asked to pick the pieces of paper, those that pick ‘yes’ were part of the sampled schools and those that picked ‘no’ were not part of the schools conducting the research. To achieve the purpose of the study, a researcher developed questionnaire was used to find out the solid waste management practices in Public Secondary Schools in Katagum Zone, Bauchi state. This questionnaire comprise two (2) sections namely: Section ‘A’ was designed to find out the demographic information of the respondents, and section ‘B’ was also designed to determine solid waste management practices method. Similarly, a four points (4) modified Likert scale response mode was adopted to collect data for the study and the rating scores were as follows: Strongly agree = 4 points; Agree = 3 points; Disagree= 2 points; strongly disagree=1 point. To ensure that the instrument measures what it is supposed to measure, face and content validity of the instrument was done by the experts in the field of health education, Department of Physical and Health Education, Bayero University Kano. The necessary corrections, suggestions and comments by all these experts were taken care of before the administration of the instrument. The reliability of the developed questionnaire was tested using test re-test reliability method with the aid of Correlation coefficient statistics. A pilot study was conducted using 40 samples of both staff and students of General Hassan Usman Katsina College Secondary School, Bauchi South Zone other than the schools in focus. After two weeks of first administration, the same instrument was administered on the same participants again. Results obtained from the first and second tests were subjected to statistical analysis of correlation (r) using Pearson product Moment Correlation coefficient and a reliability (r)=0.84 was established. This shows that the developed questionnaire is 84% reliable to be used as data collection instrument to elicit information on the use of recycling method of Solid Waste Management Practice in Public Secondary Schools in Katagum Zone, Bauchi State. The researcher used frequency count and percentage to analyze the demographic data of the
respondents while the inferential statistics of Chi-square was used to test the Hypothesis. The decision criteria were set at 0.05 alpha levels.

**Results**

**Table 4.1: Response Rate to the Study**

<table>
<thead>
<tr>
<th>School Name</th>
<th>Questionnaire Administered</th>
<th>Questionnaire Returned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population</td>
<td>Percentage</td>
</tr>
<tr>
<td>GSS Gamawa</td>
<td>86</td>
<td>22.8</td>
</tr>
<tr>
<td>GDSS Udubo</td>
<td>31</td>
<td>8.2</td>
</tr>
<tr>
<td>GSS Azare</td>
<td>80</td>
<td>21.31</td>
</tr>
<tr>
<td>GDSS Azare</td>
<td>79</td>
<td>120.89</td>
</tr>
<tr>
<td>GGSS Yana</td>
<td>62</td>
<td>16.42</td>
</tr>
<tr>
<td>GSS Disina</td>
<td>39</td>
<td>10.33</td>
</tr>
<tr>
<td>Total</td>
<td>377</td>
<td>100%</td>
</tr>
</tbody>
</table>

Note: N=Frequency count and Percentage

It can be clearly observed from the statistics displayed in Table 4.1 that, out of 377 questionnaires administered three hundred and seventy seven (377) 100% in six (6) public secondary schools in three (3) selected Local Governments in Bauchi North Area, Bauchi State; 349 (92.57%) questionnaires were successfully completed and collected for further analysis.

**H$_{01}$:** Recycling is not a significant Waste Management practice in Public Secondary Schools of Bauchi North Local Government Area of Bauchi State.

**Table 4.2: Ch-square Summary of Respondents on Recycling in Public Secondary Schools of Bauchi North Local Government Area of Bauchi State**

<table>
<thead>
<tr>
<th>Recycling</th>
<th>Observed</th>
<th>Expected</th>
<th>df</th>
<th>$X^2$ Value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagreed</td>
<td>115</td>
<td>87.3</td>
<td></td>
<td>20.639</td>
<td>.000</td>
</tr>
<tr>
<td>Disagreed</td>
<td>57</td>
<td>87.3</td>
<td>3</td>
<td>20.639</td>
<td>.000</td>
</tr>
<tr>
<td>Agreed</td>
<td>81</td>
<td>87.3</td>
<td>3</td>
<td>20.639</td>
<td>.000</td>
</tr>
<tr>
<td>Strongly Disagreed</td>
<td>96</td>
<td>87.3</td>
<td></td>
<td>20.639</td>
<td>.000</td>
</tr>
<tr>
<td>Total</td>
<td>349</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$X^2_{Cal} = 20.639$, df =3 (P < 0.05). $X^2_{tab} = 7.82$

Statistics in Table 4.2 shows chi-square value ($X^2$) of 20.639 with degree of freedom of 3. Therefore, the table value (critical) of chi-square is 7.82 at 0.05 level of significant is less. It has been established that calculated chi-square value ($X^2$) is greater than (≥) the Critical Value; as such the null hypothesis one that say Recycling is not a significant Waste Management practice in Public Secondary Schools in Katagum zonal Area of Bauchi state is rejected. This means that recycling is a significant waste management practice in public secondary schools in Katagum zonal Area of Bauchi state.

**Discussion**

The study investigated used of recycling method of solid waste management practices in public secondary schools in Katagum zone, Bauchi state. The outcome of the study revealed that, public secondary schools practice recycling method of solid waste management. The finding is in
line with the study conducted by Erhrampoush (2015) on attitude and practices of Yazd University solid waste management recycling and disposal in Iran, which revealed that, recycling method is a beneficial way to reduce solid waste items such as metal cans, plastic bottles and cartons; paper products which are recyclable for another purpose. The findings also corroborated with the study conducted by Moghadam (2011) on survey of knowledge and practice of solid waste recycling among University students in Mexico, where he reported that, bottles, cans, boxes, paper, cardboard, newspaper, cottons are re-cycled and reused. Furthermore, findings are consistent with the research conducted by Mesgarof et-al (2011) on solid waste recycling practices among students of Isfahan University Iran. The findings confirmed the re-used of solid wastes that are organic in nature like plants, foods, scraps, paper products are converted to local manure for agriculture. This finding is supported by Amini and Ramazani (2011) who conducted a research on solid waste management practices for environmental protection at 4th national conference Congress University of Iran, which revealed that, generated solid wastes are recycled for other purposes as empty cartons are used as local dustbins, damage furniture into fire wood for cooking foods in the school.

**Conclusions/Recommendation**

Public secondary schools of Katagum zone, Bauchi State used recycling method of waste management in their schools in katagum zone, Bauchi State. Bauchi state Governments Authorities and Katagum zone public secondary schools precisely should provide the needed facilities for construction and maintenance of recycling method of solid waste management’s in their schools. The management of public secondary schools in Katagum Zone, Bauchi State should sustain and promote the idea of used of recycling as cost recovery method of solid waste management’s in their schools.

**References**


