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Adverse Effects of Inappropriate Solid Waste Disposal System on Environment, Health and People's Livlihood in Sodo Town, Wolaita Zone, Ethiopia

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Abstract

Waste is not itself a bad thing, rather it is a poor waste management system that is wasteful and dangerous. Proper solid waste management has to be undertaken to ensure that it does not affect the environment, health and people's livelihood. The main aim of this study was analyzing the adverse effects of solid wastes on environment, health, and people's livelihood in Sodo town. The urban poor, living in inadequate overcrowded shelters, are particularly vulnerable to diseases such as typhoid, diarrhea, cholera, malaria and intestinal worms from contaminated water and food, poor drainage and garbage collection. The urban poor, living in inadequate overcrowded shelters, are particularly vulnerable to diseases such as typhoid, diarrhea, cholera, malaria and intestinal worms from contaminated water and food, poor drainage and intestinal worms from contaminated water and food, poor drainage and garbage collection.

Keywords

Solid wastes • Environment • Health • Livelihood • Multivariate analysis

Introduction

The most difficult challenge many cities in the developing world are facing today in relation with environmental health service is lack of proper solid waste management. According to ogawa, management and safe disposal of wastes refers to the integrated control of unwanted materials, which would otherwise be harmful to the environment, human health and people's livelihood. Even though developed countries generate greater quantity of solid wastes than the developing one, its problem is more severe in developing countries than developed countries [1]. According to United Nations Environment Programme (UNEP), if solid wastes are not properly dealt with, they can cause tremendous damage to consumers, firms and the nation at large since most wastes have externality effect. Inefficient solid waste disposal system increases contamination of ground and surface water, damages ecosystem services, discourages tourism, discourage business activities, and increase disease transmission [2,3]. It causes losses of lives in the city and reduces individual productivity, which in turn will be reflected in deteriorated environment and poor quality of life. The urban poor, living in inadequate overcrowded shelters, are particularly vulnerable to diseases such as typhoid, diarrhea, cholera, malaria and intestinal worms from contaminated water and food, poor drainage and garbage collection. This will have its own implications on the general economic growth of the cities and hence the country. The challenge here is to develop and promote appropriate disposal system that requires a minimum level of mechanical equipment [4]. Proper handling of wastes, therefore, is becoming a major public health and environmental concern of cities all over the world

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especially in developing countries where financial and technical scarcity is very serious. In Ethiopia, with the current growth rate of urban population in the country, it is estimated as solid waste generation rate increases with population growth and economic development, and the amount solid wastes in urban areas of the country will be double within a similar time range. According to the WHO report, the Average Global Municipal Solid Waste (AGMSW) generation per person on daily basis is about 1.2 kg and the figure is expected to rise up to 1.5 kg by 2025. Therefore, it is urgent that the government should set appropriate solid waste disposal strategies in the cities to improve environmental amenities and provide clean environment at household level. As sodo town is one of the rapidly growing towns, the daily generation rate of wastes in the town is increasing from time to time. According to the finding of Endrias Goa and Solomon Sorsa, the daily solid waste generation per person in the town is 0.47 Kg and the town generates more than 188 tons of solid wastes per year. This huge amount of solid wastes generated in the town requires an appropriate management system to protect and bring about a healthy and sustainable environment. But, the local authority legislations are generally careless on regulating the ever-increasing solid wastes in the town. Previously, almost no studies have been done in the area of analyzing the adverse effects of solid wastes on environment, health and people's livelihood in the town. The study undertaken by Endrias Goa and Solomon Sorsa was only aimed at analyzing the generation rate and physical composition of solid wastes in Sodo town. Thus, the need for adequate solid waste management system is unquestionable and this study was motivated to analyze the adverse effects of solid wastes on environment, health and people's livelihood in sodo town to put an agenda on policy interventions.

Materials and Methods

Description of the study area

This research was conducted in sodo town, wolaita zone, Ethiopia. Sodo town is one among the 12 districts and 3 urban administrations in wolaita zone. It is found at 383 km from South of addis ababa, capital city of the country, and 160 km from South West of Hawassa, the regional city. The topographic feature of the town contains plain, plateaus, gorges and rugged mountain system. The town is bordered by Sodo Zuria district from South and East, Damot Sore district from West, and Damot Gale district from North. It has three sub cities (namely: Mehal Kifle Ketema, Merkatto Kifle Ketema and Arada Kifle Ketema). The town has a total of 37,266 households [5]. The study used both quantitative and qualitative approaches to investigate the adverse effects of inappropriate solid waste disposal system on environment, health and people's livelihood in Sodo town. The study employed a cross-sectional data type; primary data source; simple random sampling technique; household heads as unit of analysis; 156 respondent households as sample size; and both descriptive and econometric analysis (multivariate regression) as method of data analysis.

Descriptive analysis

Major sources of solid wastes and types of their adverse effects on environment, health and livelihood of people were identified in the town using descriptive statistical analysis approach [6,7].

Econometric analysis

The level of adverse effect on environment, health and livelihood of people that was associated with poor solid waste disposal system in the town was analyzed using multivariate regression analysis.

Model specification

The study involved three dependent variables (namely: level of risk on environment, on health, and on people's livelihood) and one explanatory variable (namely: level of adverse effect of solid waste disposal system) to capture the adverse effects of solid wastes on environment, health and people's livelihood through multivariate regression analysis. Usually, approach is used as it is obligatory for estimating multiple response variables and one independent variable.

Dependent variables

Three response variables level of risk on environment (0=if no risk on environment; 1=if low risk on environment; 2=if high risk on environment); Level of Risk on Health (RPH) (0=if no risk on health; 1=if low risk on health; 2=if high risk on health status of people); and Level of Risk on People's Livelihood (RLP) (0=if no risk on livelihood; 1=if low risk on livelihood; 2=if high risk on people's livelihood) as a result of adverse effects of solid wastes were selected as dependent variables.

Explanatory variable

The variable "level of adverse effect of poor solid waste disposal system" which was explained as reduction of environmental quality, contamination of water and air, disease transmissions by pathogenic organisms, discouragement of business activities, and increasing cost of living to the society in the town was introduced in to the model as explanatory variable. It was treated as dummy variable which takes 0 if solid waste disposal system was appropriate and has no significant adverse effect on environment, health and livelihood of people, if it was poor and has significant adverse effect on environment, health and people's livelihood in the town.

Results

This part focused on the estimation, presentation and interpretation of empirical findings. The part starts by presenting descriptive statistical analysis followed by the econometric results. For regression analysis, only data from 156 households was used to find the level of adverse effect of solid wastes on environment, health and livelihood of people in Sodo town. (Table 1 and 2)

 Table 1. Respondents' reflection on whether solid waste disposal system in Sodo town was appropriate or not.

Response category	No of respondents	Percentage
appropriate	23	14.74
inappropriate	133	85.26
Total	156	100

 Table 2. Respondents' reflection on whether the solid waste disposal system in the town is problem or not.

Response category	No of respondents	Percentage
it is not a problem	18	11.54
it is a problem	138	88.46
Total	156	100

According to the response rate presented on the table 1 and 2 above, the solid waste disposal system in Sodo town was inappropriate and it was a problem to the dwellers as majority of respondents (85.26% and 88.46%) respectively responded. (Tables 3-14)

Table 3. Respondents' reflection on sources of solid wastes in the town.

Sources of solid wastes	No of respondents	Percentage
Residential	59	37.82
Industrial	9	5.78
Commercial	60	38.46
Institutional	20	12.82
Municipal	6	3.85
Agricultural	2	1.27
Total	156	100

 Table 4. Respondents' reflection on the availability of solid waste disposing container around their locality.

Availability of container	No of respondents	Percentage
Not available	127	81.41
Available	29	18.59
Total	156	100

Table 5. Respondents' reflection on the ways of solid waste utilization in the town.

Ways of solid waste utilization	No of respondents	Percentage
Throw it on open space, on street	39	25
Throw it in to nearby ditch	58	37.18
Burn it in compound	26	16.67
Dispose on the backyards of the house	11	7.05
Sale for recyclable SW collectors "Qurales"	5	3.21
Exchange with HH utensils 'Liwach'	5	3.21
Freely give to SW collectors	12	7.68
Total	156	100

 Table 6. Respondents' reflection on whether there was supervision of illegal disposal of solid wastes in the town or not.

Trends of supervision of illegal solid waste disposal	No of respondents	Percentage
No supervision and control	103	66.03
There is supervision and control	53	33.97
Total	156	100

 Table 7. Respondents' reflection on the level of effort made by municipality to provide efficient solid waste disposal system in the town.

Level of effort made by municipality	No of respondents	Percentage
Very strong	1	0.64
Strong	13	8.33
Fair	49	31.41
Weak	50	32.05
Very weak	43	27.57
Total	156	100

 Table 8. Respondents' reflection on whether the level of risk on Environment was significant or not.

Risk Level on Environment	No of respondents	Percentage
No any risk on environment	8	5.13
Low risk on environment	59	37.82
High risk on environment	89	57.05
Total	156	100

 Table 9. Respondents' reflection on whether the level of risk on health status was significant or not.

Level of risk on Health status of People	No of respondents	Percentage
No any risk at all	12	7.69
Low health risk	71	45.51
High health risk	73	46.8
Total	156	100

 Table 10. Respondents' reflection on whether the level of risk on livelihood of people was significant or not.

Level of risk on livelihood of People	No of respondents	Percentage
No any risk	1	0.64
Low risk	45	28.85
High risk	110	70.51
Total	156	100

Table 11. Respondents' reflection on the types of adverse effects on environment.

Types of adverse effects on environment	No of respondents	Percentage
No adverse effect on environment	15	9.62
Water contamination	15	9.62
Damage of ecosystem service	41	26.28
Land degradation	4	2.56
Air pollution	32	20.51
All of these effects	49	31.41
Total	156	100

Table 12. Respondents' reflection on the types of adverse effects on people's livelihood.

Types of adverse effects on people's livelihood	No of respondents	Percentage
No adverse effect	4	2.56
Discourages production	25	16.03
Discourages business activities	68	43.59
Discourage tourisms	5	3.21
Affects household income	54	34.61
Total	156	100

 Table 13. Respondents' reflection on the types of adverse effects on their livelihood.

Types of Diseases	No of respondents	Percentage
No any disease occurred	9	5.77
Intestinal worms	7	4.49
Typhoid	71	45.51
Cholera	3	1.92

Malaria	20	12.82
diarrhea	39	25
Others (Common cold, etc.)	7	4.49
Total	156	100

Table 14. The summarized results of multivariate regression analysis.

Equation	Obs	Parms	RMSE	"R-sq"	F	Ρ
Risk level on environment	156	2	0.485448	0.3395	79.1421	0
Risk level on people's health	156	2	0.345033	0.4348	118.4615	0
Risk level on people's livelihood	156	2	0.548109	0.2434	49.53776	0

Discussion

Interpreting for meaning of signs of regression coefficients, significance and their explanatory ability along with the values and the magnitude of coefficients were undertaken in the following manner. As expected prior, all the slope coefficients in the model have the expected positive signs. Solid waste disposal system in the town was inappropriate and directly correlating to the environmental risk, health risk and risk on people's livelihood.

Adverse effects of solid wastes on environment

Based on the results of multivariate regression analysis, environmental risk level has shown a positive correlation with solid waste disposal system in the town.

Adverse effects of solid wastes on people's health status

Based on the analysis result, risk on people's health has shown a positive correlation with of solid waste disposal system in the town.

Adverse effects of solid wastes on people's livelihood

Based on the analysis result presented above, the level of risk on people's livelihood has shown a positive correlation with solid waste disposal system in the town. The slope coefficient 0.856 suggested as a one unit increase in adverse effects of solid wastes which were dumped around residence in the town was resulting in a 0.856 unit increase in risk on people's livelihood (it discourages business activities, affects household income, and discourages production) by suggesting a direct correlation between risk on people's livelihood and solid waste disposal system holding the effect of other factors constant.

Conclusion

The study concluded as the solid waste disposal system in Sodo town was inappropriate and significantly determining environmental risk as solid wastes were damped on open space, on street and in the nearby which in turn damage ecosystem service, pollute air and contaminate ground and surface water. Solid waste was determining health risk as it increases the spread of diseases such as typhoid, diarrhea, malaria and intestinal worms. It was also affecting the livelihood of people as it discourages business activities, affects household income, and discourages production in the town.

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