

SOLID WASTE DISPOSAL AMONG URBAN AGRICULTURAL HOUSEHOLDS IN LOWLAND AREA OF YAOUNDE

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Abstract

Low waste collecting rates make waste a growing problem in lowland areas of the capital of Cameroon Yaoundé. However, the biodegradable proportion of waste is high and could be reused. The aim of this study is to understand the behavior of farm households in view of managing their solid waste. Indeed, this paper seeks to identify factors that affect the choice of a method of solid waste disposal by agricultural households in the lowland area of Yaoundé. Data from a survey conducted by the French Agricultural Research Centre for International Development (CIRAD) have been used. The results from multinomial Logit indicate that household size and the accessibility of the area of residence increase the probability of choosing municipal infrastructures relative to recycling waste and/or illegal dumping. Compared to bins and garbage trucks, the number of years in the area, agricultural experience and the distance to the communal containers promote illegal dumping or recycling. In this context, transfer stations for household waste, should be constructed in or near the lowland areas to facilitate their management of waste by the collectors and by households for their farming activities.

Key words: *Solid Waste Recycling, Farm Households, Multinomial Logit Model.*

Introduction

Due to urban population growth and expansion of the space occupied, the management of solid waste is a big problem in cities in developing countries. As in many African countries, in Cameroon, many neighborhoods do not receive collection municipal service for solid waste (Parrot *et al.*, 2009). In Yaounde, rates of solid waste collection remain low in particular in lowland areas. Indeed the average collection rate is estimated at only 43% (Sotamenou, 2010).

Household wastes in cities of developing countries have different alternative destinations (Tadesse, 2007). Although wastes are used as organic amendments (Ngeugang, 2008; N'dienor, 2006; Nkamleu, 1996), very few people in the lowland areas of Yaounde have tapped this economic potential. However, agriculture is mainly practiced in these lowlands which are also a refuge for poor households who live mainly by their production (Masocha, 2006).

In a context where public service of solid waste management is ineffective (Sotamenou, 2010) especially in the lowland areas and that, the use of organic wastes emerges as a credible alternative to firstly ensure the sustainability of farms urban and secondly reduce waste pollution. It is imperative to understand behavior of farm households in the logic of managing their solid waste.

Materials and methods

The data used in this study are those of the French Agricultural Research Centre for International Development (CIRAD). They were collected in 2005 during the development

project of the lowland areas of Yaoundé in partnership with the Ministries of Agriculture and Scientific Research. The sampling frame consisted of all “agricultural” households of the urban area of Yaoundé. As far as this study is concerned, the survey highlights the socio-economic characteristics of household heads, household socioeconomic indicators, types of inputs used, types and quantities of waste utilized and waste disposal practices.

In microeconomic theory, consumers consume goods or services so as to optimize the utility they derive from it. Following Tadesse (2007), in this study, agricultural households are assumed to choose the disposal alternative¹ that maximizes the unobserved (indirect) utility.

The determinants for solid waste disposal among agricultural urban households were analyzed using multinomial logistic regression models, for this purpose the econometrics software Stata was used.

Results and discussion

Disposal practices among agricultural households

Actually a household can use one or a combination of these alternatives. Then, **table 1** shows only the primary mode of solid waste disposal in each household. Indeed, in the agricultural lowlands area, recycling in agriculture is the primary solid waste disposal method. In fact, on average 50 percent of households use this method to sustainably manage their waste. While remaining the most commonly used alternative, recycling differs considerably depending on the accessibility of the area of residence. Indeed, 60% of farm households who reside in areas with difficult access recycle their waste against only 45% of people living in areas with easy access. The communal containers are the most demanded infrastructure in the lowland areas of the city (INS, 2002), thus only 17 percent of agricultural households discharge their garbage in trucks and communal containers and 33 percent of them prefer to dispose their waste directly in open areas or burning it either burying it in their home. Since the accessibility of the area of residence influences the availability and use of communal services, the results show how the use of communal containers differs significantly depending on the accessibility of the neighborhood. Indeed, 26% of farm households in accessible areas against only 6% in inaccessible areas evacuate their garbage in communal containers.

Table 1: Primary household solid waste management mechanisms.

Waste management types	Proportion
Communal containers	17%
Dumping in open areas, burning and illegal landfill at home	33%
Recycling in agriculture	50%

Few heads of households (26%) affirm to have no academic standard level and 75 percent of family heads of the agricultural areas of Yaoundé are men. In reference to the theory of human capital, this could explain the relatively low levels of income. Indeed average 47 percent of farm managers earn monthly less than 90,000 FCFA² (\$ 179). Range between 15 and 68 years, the average age of farm household heads is 40 years. Household size ranges

¹ In this study, there are three waste disposal alternative destinations available to farm households. The first waste disposal alternative is communal waste containers provided by the municipality (alternative 1). The second alternative is dumping in open areas and roadsides (alternative 2). The third alternative is recycling into agriculture.

² \$ 1 egal 503,151 Fcfa

from 1 to 9 persons with six persons per household at mean, for an average production of solid waste per day equal to 3.4 kilograms. In lowland areas, the practice of farming is relatively new compared to the arrival of households in these areas. In fact, the mean age of agricultural experience of respondents is 11 years when they had spent on average 22 years in these areas, yet their homes are still relatively distant from municipal containers. Indeed, they must cover 615 meters at mean to evacuate their residues. This situation can explain the low utilization rate of communal waste disposal infrastructures. Due to the organic nature of waste, the respondents prefer simply to manage their waste by recycling it into agriculture. In these zones, plots are usually cultivated near homes. Despite the very high land pressure and low levels of income, 48 percent of households engaged in agricultural activities are owners of their plots, 75 percent of their homes and, furthermore, 66 percent on average among them live in easily accessible neighbourhoods.

Factors influencing solid waste disposal decision making by agricultural households

The results indicate that the variables number of years in the area, agricultural experience, distance to the communal containers, household size and the accessibility of the area of residence (table 2) were significant and explained the choice of waste destinations among farm households.

Table 2. Multinomial logit estimation for solid waste disposal.

Variables	Illegal dumping		Recycling	
	Coefficients	P>z	Coefficients	P>z
Age of household head	.035(0.038)	0.356	-.015(0.0404)	0.696
Household head education				
	.727(0.911)	0.425	1.302(0.960)	0.175
Secondary	.237(0.953)	0.804	.890(0.992)	0.370
Higher	-.171(1.257)	0.891	-.388(1.303)	0.766
Family size	.0427814(0.161)	0.791	-.293(0.173)	0.091** *
Total income of household head				
Income2 (between 50,000 and 90,000)	-1.150(1.046)	0.272	.061(1.102)	0.955
Income3 (between 90,000 and 200,000)	-.280(0.953)	0.769	-.104(1.036)	0.920
Income4 (more than 200,000)	13.574(1317.22)	0.992	16.803(1317.226)	0.990
Years of stay in the neighborhood	.084(0.032)	0.011**	.068(0.035)	0.050**
Household head agricultural experience	.122 (0.076)	0.108*	.280(0.079)	0.000*
Location of the household	-2.420(0.886)	0.006*	-4.095(.970)	0.000*
Distance to waste containers				
Between 100 and 500m	2.395(1.352)	0.076***	2.836(1.387)	0.041** *
Between 500 and 2,000m	.447(0.861)	0.603	-.151(0.959)	0.875
More than 2,000m	-.417(1.023)	0.684	-.704(1.131)	0.534
Ownership of home	-.2218917(0.797)	0.781	.923(0.868)	0.288
Constant	1.252(1.812)	0.490	.683(1.881)	0.716

Number of years in the neighborhood has a positive impact on the probability of choosing alternatives such as illegal dumping and recycling into agriculture. Indeed, as far as illegal dumping is concerned, this result finds an explanation when the marginal disutility of pollution is decreasing. In terms of recycling, having integrated the lack of waste collection infrastructures in their management program, farm households have no better other choices

than recycling. Accessibility of the residential area negatively influences the probability of choosing management methods such as illegal dumping and recycling. This result is explained by the fact that accessible area receives more municipal waste infrastructure. Because recycling activities require a lot of physical effort and time; farmers may eventually prefer to confide their waste to municipal waste collection services. The farming experience of household head positively affects the probability of choosing recycling of household waste. By this action, farm households significantly reduce the mass of their waste which have to be evacuated and at the same time receive benefits in terms of improving soil quality. The distance between home and communal containers positively influences the probability of managing household waste by methods such as organic recycling and illegal landfills. This result is consistent with results from Tadesse (2007) and INS (2002). Household size negatively significantly affects probability of choosing recycling. If this result seems paradoxical, since the practice of recycling requires much muscular effort, an explanation is found in that; it is usually the children (proxy of family size) that carry waste from the house to the communal containers (De la Laurencie, 2002).

Conclusion

In the lowland areas, household wastes are reused into agriculture. The results of this study show that demographic characteristics, geographic features and waste facility attributes appear to influence disposal behavior among agricultural households in lowland areas of Yaoundé.

Several policy implications arising therefore: First, it appears useful to reduce distances between collection infrastructures and homes by the establishment of waste facilities which collect waste and get it to assembly centers. Second, improving the accessibility of residential areas. The goal is to increase the provision of waste collection services. Third, promotes waste recycling in agriculture by some sort of awareness or by encouraging the farm household heads to join agricultural organizations.

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