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ORIGINAL

Municipal management of solid waste segregation. Villa María del Triunfo, 2021

La gestión municipal en la segregación de residuos sólidos. Villa María del Triunfo, 2021

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ABSTRACT

This investigation was concerned with an inadequate management of the inorganic waste reuse plan caused by an inadequate management of the strategies in the municipality of Villa María del Triunfo. The objective was to verify the influence of municipal management on the segregation of solid waste in the Villa María del Triunfo district. The basic type research, with the hypothetical-deductive method; with a non-experimental, transectional, causal correlational design; it had a population of 294 working people from the municipality of Villa Maria del Triunfo, for this purpose a cluster was used in order to obtain the sample, which finally consisted of 167 participants submitted to the evaluation through two instruments: questionnaire on segregation of inorganic waste and questionnaire on municipal management; prior informed consent. The data was processed to obtain descriptive and inferential information, using the logistic regression and SPSS Software 25 for the latter, finding that the factors explain 65,11 % of the variability of the municipal management instrument and the factors explain 59,24 % of the variability of the solid waste segregation instrument with a significance level of 0,000.

Keywords: Management; Municipal; Waste; Segregation; Solid Waste.

RESUMEN

Esta pesquisa tuvo como inquietud una inadecuada gestión del plan de reutilización de desechos inorgánicos originada por una inadecuada gestión de las estrategias en el municipio de Villa María del Triunfo. El objetivo fue verificar la influencia de la gestión municipal en la segregación de residuos sólidos en el distrito de Villa María del Triunfo. La pesquisa de tipo básica, con método hipotético-deductivo; con un diseño no experimental, transeccional, correlacional causal; conto con una población de 294 personas trabajadoras del municipio de Villa María del triunfo, con este fin se utilizó un clúster a fin de obtener la muestra, que finalmente estuvo constituida por 167 participantes sometidos a la evaluación a través de dos instrumentos: cuestionario sobre segregación de residuos inorgánicos y cuestionario sobre la gestión municipal; previo consentimiento informado. La data fue procesada para obtener información descriptiva e inferencial, utilizándose para este último la regresión logística y Software SPSS 25 encontrándose que los factores logran explicar el 65,11 % de la variabilidad del instrumento gestión municipal y los factores logran explicar el 59,24 % de la variabilidad del instrumento segregación de residuos sólidos con un nivel de significancia del 0,000.

Palabras clave: Gestión; Municipal; Residuos; Segregación; Sólidos.

INTRODUCTION

This thesis will investigate implementing a work plan to improve the on-site recycling program with municipal workers and companies in the district under study for the current year. We will seek to ensure that the municipal authorities currently in office strategically manage this program.(1) This thesis will serve as a

working guide for the municipality under study in the construction of a better strategy for the general waste generated in this place.[2]

According to Zhang et al.[3], poor management of organic and inorganic waste negatively impacts the environment and, in particular, the health of people living in a given place, in our case, the district of Villa María del Triunfo. Urban areas are falling behind in welcoming the groups that live there. In many cases, they are becoming an unhealthy environment due to all the waste disposed of, which leads to the appearance of various pests and vectors and foul odors from decomposition processes. We are not referring to the poor landscape, which creates a negative perception in the mind due to the poor situation and lack of security.

Improving the efficiency of municipal organic and inorganic waste management does not depend solely on municipalities or regional governments, which, as mentioned above, are responsible for its management and, therefore, for the habits and customs of the people living in Villa Maria, which is a variable that will have to be addressed in any case.[4] No municipal cleaning system can function optimally if the people it serves lack adequate environmental awareness, which is evident in their education, habits, and customs. The district that is part of the research is affected by this problem, due to poor management of the street cleaning service by the environmental management and beautification department, the administration of the annual waste recycling program, and the failure to comply with the on-site recycling program, which has operational deficiencies, a lack of compactors, and other difficulties that, added to the low level of culture and bad habits of some sectors of the district, On the other hand, some factors increase environmental pollution. Among the main ones are that the district's inhabitants are only concerned with getting rid of their waste Pierini et al.[5], without thinking about its final destination and the consequences it may have on our environment. Similarly, organic and inorganic waste are thrown onto the streets and accumulate on sidewalks, roads, squares, etc. Ferronato et al.[6], showing a negative environmental impact. For this reason, by improving the on-site collection plan and constantly collecting solid waste in the district under study, we will seek to support the improvement of people's prospects, forming an environmental culture in the districts and the lives of residents.[7]

Población	Generación total (kg/día)			Generación total (kg/día)	GPC municipal (kg/día)
	Domiciliario	No Domiciliario	Especiales		
433 822	314 548	134 817	407	449 773	1,04

Source: 2019 Solid Waste Characterization Study – Viila Maria del Triunfo

Figure 1. Municipal per capita solid waste generation

Fuente De Generación Municipal	Generación Total (T/Año)	Generación Total (T/Día)
Domiciliarios	114 810,12	314,55
Establecimientos comerciales	12 826,39	35,14
Hoteles	812,63	2,23
Mercados	24 448,44	66,98
Restaurantes	3 267,10	8,95
Instituciones públicas y privadas	1 794,82	4,92
Instituciones educativas	5 560,83	15,24
Barrido de calles	298,52	0,82
Establecimientos de salud	199,56	0,55
Lubricentros	83,94	0,23
Centros veterinarios	64,72	0,18
TOTAL	**164 167,09**	**449,77**

Source: solid waste characterization study 2019 – Viila Maria del Triunfo

Figure 2. Estimated solid waste generation in the municipality of Villa María del Triunfo

In the Villa María del Triunfo area, waste from animals such as rats can be seen in various urban developments, which is a link to the excessive increase in pollution. The municipal administration is also responsible for implementing the solutions proposed to address the complicated difficulties that have not yielded the expected results. We would therefore like to know how the municipal administration of Villa María del Triunfo can solve an environmental problem that significantly impacts the health of the district's citizens. We propose an innovative solution for the district that is sustainable over time for both the public and private sectors, enabling them to provide adequate solid waste management. It is essential to emphasize that environmental

education includes developing capacities in various areas, including people, properties, multiple institutions, various companies, the medical sector, and local governments.[8] Therefore, these data extracted from the 2019 municipal solid waste analysis study of the district of Villa María del Triunfo show the current reality of per capita and municipal waste generation in the district at this time.

Based on the current situation, Malaspina et al.[9] formulated the general problem: what is the influence of municipal administration on solid waste segregation in the municipality of Villa Maria del Triunfo in 2021?

This research is justified from the convenience perspective insofar as it sought to provide tools to the municipality, improve the municipal management process with solid waste management, and have a group of people responsible for the issue.[10] Furthermore, the social relevance of this research was aimed at improving municipal administration about solid waste segregation, which contributed to improving the recycling process and raising awareness among the population through a coordinated system in the District of Villa María del Triunfo.[11] From a theoretical perspective, the main baseline has been the laws of Peru, which, through the Ministry of the Environment in coordination with the municipalities, classify the various tasks, activities, and procedures carried out in Peru and every existing municipality.[12] These laws and regulations play a detailed role in improving municipal administration processes, solid waste segregation, and cultural, social, economic, and political aspects. All these factors are considered in different situations and must be decided upon to manage them. Practical implications. It is essential because it gives us the information needed to include the results for the municipality's benefit and thus have corrective measures for better quality in municipal administration and waste recycling.[13] Methodological usefulness: we found the information through a survey and used a questionnaire prepared with the appropriate questions related to the topic.

Based on the explanations provided by Ramírez-Elías et al.[14], it is necessary to set the following general objective: to determine the influence of municipal administration on waste segregation in the municipality of Villa María del Triunfo, 2021.

Finally, the following three specific hypotheses were taken into consideration:

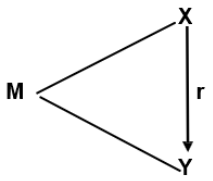
- Municipal management influences solid waste collection in Villa María del Triunfo in 2021.
- Municipal management influences solid waste transport in Villa María del Triunfo in 2021.
- Municipal management influences the final disposal of solid waste in the municipality of Villa María del Triunfo in 2021.

METHOD

Type and design of research

Type of research: the type of research was basic, as indicated by Tamayo[15] within the context of theory, where the primary purpose would be to develop theory by applying broad generalities, i.e., investigating knowledge of events. The approach is quantitative, insofar as measuring variables and contrasting or associating them is possible.[16] In addition, it falls within the framework of hypothetical-deductive research, which is a methodological procedure that consists of taking statements as hypotheses and testing those hypotheses by inferring conclusions from them, together with the knowledge we already have, which we then compare with what has happened.[17]

Research design: the research is non-experimental, cross-sectional, correlational-causal. Therefore, the variables to be studied will not be modified. Unusual situations are verified in detail, obtaining direct data for subsequent analysis. In the same way, the relationships between two or more variables in a given situation are explained. In correlational terms, the function is the cause-effect relationship.[18]



M: Muestra.
X: Revisión de la variable gestión de municipal.
r: Relación entre variables.
Y: Revisión de la variable segregación de residuos sólidos.

Figure 3. Outline of the research design for the variables

Variables and Operationalization

The variables studied were municipal management and solid waste segregation. The variables for a research

project are measurable, a series of information and data collected to answer the research questions and provide details of the objectives.[19]

Operationalization is a process based on defining the variables and demonstrating how they will be measured. These are divided into dimensions, and the measurement parameters are determined in indicators.

Independent variable (X): Municipal management

Conceptual definition: these are the various actions taken by municipalities to meet the social and environmental needs of a community. Those administering a municipality must coordinate their development actions with the corresponding populations.[20]

Operational definition: municipal administration was analyzed based on the value in a questionnaire administered to people working in Villa María del Triunfo.

Dependent variable (Y): Solid waste segregation

Conceptual definition: process by which various types of waste that can be reused must be separated in the best possible way. In this way, we will actively contribute to a cleaner and more sustainable economy, reducing the overall amount of waste and making the best use of all reusable materials through recycling.[21]

Operational definition: waste segregation was rated using a score from a questionnaire administered to people working in the municipality of Villa María del Triunfo.[22]

Population, sample, sampling, and unit of analysis

Population: for the population study, the total number of people surveyed in the municipality of Villa Maria del Triunfo was 294. This indicates that it is a group of people with similar profiles about their work in the municipality, all of whom are waste generators and were able to voluntarily respond to the survey.[23]

Sample: in this research, a representative sample of 167 municipal employees and/or workers was considered. The representative sample size was found using a statistical formula. According to García-García et al.[24], the sample is a representation of the total population, which provides information for research work, where variables can be measured and observed.

The following notation was used to determine the sample:

$$n = \frac{NZ^2pq}{(N-1)e^2 + pq\,Z^2}$$

Donde:

n:	Muestra	
N:	Población	294
Z:	Nivel de confianza	1,96
P:	Eventos favorables	0,5
Q:	Eventos desfavorables	0,5
E:	Margen de error	0,05

$$n = \frac{(294)(1{,}96)^2(0{,}5)(0{,}5)}{(294-1)(0{,}05)^2+(1{,}96)^2(0{,}5)(0{,}5)} = \frac{(294)(3{,}8416)(0{,}25)}{(293)(0{,}0025)+(3{,}8416)(0{,}25)}$$

$$n = \frac{144{,}06}{0{,}3725+0{,}9604} = \frac{144{,}06}{1{,}3329} = 166.78$$

$$n = 167$$

Figure 4. Determine the sample

Sampling

The non-probabilistic method was applied; according to Torales et al.[25], this consists of intentionally choosing the research group, which involves selecting representative elements at the researcher's discretion. It is the instrument to be investigated, which works by selecting units representing predictions of the population under study.

Unit of analysis

The unit of analysis is the name given to the components to which the characteristics belong, which occur in a given context, thus defining the population.[26] For our research, this is the municipality of Villa María del Triunfo's workers.

Data collection technique and instrument

Techniques: first, a survey and questionnaire were used to collect data. According to Hernández et al.[18], a survey is a technique whereby a questionnaire is applied to a sample group to obtain quantitative data. Similarly, it is an instrument that allows us to gather information by applying a specific number of questions to the entire representative sample, with the particularity that consistency must be maintained between the problem posed and the hypotheses to be demonstrated.

It involves the use of a wide variety of technical tools that are used to analyze and develop the various systems to inform us about the topics under study, with the help of some market research tools such as surveys, interviews, questionnaires, observation, etc.[27]

Instruments: these are various resources that the researcher can use to obtain the data and information needed to demonstrate the proposal's validity. They summarize what the theoretical framework can contribute to selecting data that feed into measurable indicators.[28]

The Municipal Management Questionnaire measures results in four dimensions: work planning, work organization, work management, and work control.

The solid waste segregation questionnaire quantifies the variable in three dimensions: collection, transport, and final disposal.

Validity: this was carried out by qualified teachers with research experience, who proposed an instrument validation form on which they recorded the validation results and gave their approval for its application using a percentage of approval. Hernández et al.[18] tell us that the instrument supports the adequacy of the variables we intend to measure in the study.

Reliability: to validate the research analysis of the instrument through the variables under study, municipal management, and solid waste segregation, we will use the statistical technique of structural equations in the smartpls application. This measurement was carried out with Cronbach's alpha coefficient indicators, and the research determined the reliability. According to the instrument's reliability will be related to its adequacy, as it provides us with the exact measurements in different circumstances. In addition, assessing the feasibility of a study allows us to demonstrate the internal consistency of all the indicators we will measure.

Procedures

After collecting the information, we proceeded to develop the database, a descriptive analysis in SPSS version 25, which was presented in statistical figures in frequencies and percentages; determination of normality, hypothesis testing, or inferential analysis in SPSS v25, in statistical figures that were carried out according to the results of the normality test.

Data analysis method

Descriptive statistics will be used, which will significantly help us to demonstrate the results obtained for each of the variables under study.[23] In the respective descriptive analysis, figures have been used to observe values, percentages, and frequencies. Similarly, the hypotheses will be tested using multiple binary logistic regressions. SPSS version 25.0 software will be used to carry out all these steps and obtain results that can be interpreted.

Ethical aspects

The writing style approved by César Vallejo University was used, and procedures, authors, and all bibliographic references were respected. All data are accurate and verifiable, and the results will be issued by the applicable instruments, always considering moral and ethical principles concerning all citations.[29]

RESULTS

Descriptive analysis

The frequency distribution results show that of the 167 participants, 11,4 % perceive solid waste segregation as poor, 74,3 % consider it average, and 14,4 % perceive it as efficient. On the other hand, of the six collaborators considering municipal management poor, 33,3 % associate it with poor solid waste segregation, and 66,7 % with fair. In addition, of the 109 participants who consider municipal management average, 11,9 % associate it with poor solid waste segregation, 70,6 % with average, and 17,4 % with efficient. Finally, of the 52 employees who consider municipal management to be good, 7,7 % associate it with poor solid waste segregation, 82,7 % with average, and 9,6 % with efficient.

The results show that of the 167 participants, 13,7 % perceive solid waste collection as poor, 73,1 % as average, and 13,8 % as efficient. Likewise, of the six participants who consider municipal management poor, 100 % associate it with average solid waste collection. Of the 109 collaborators considering municipal management average, 11 % associate it with poor solid waste collection, 73,4 % with average, and 15,6 % with efficiency. In addition, of the 52 participants, 19,2 % associate it with poor solid waste collection, 69,2 % with average, and 11,5 % with efficient.

			Segregación de Residuos solidos			Total
			Deficiente	Regular	Eficiente	
Gestión municipal	Mala	Recuento	2	4	0	6
		% dentro de Gestión municipal	33,3%	66,7%	0,0%	100,0%
	Regular	Recuento	13	77	19	109
		% dentro de Gestión municipal	11,9%	70,6%	17,4%	100,0%
	Buena	Recuento	4	43	5	52
		% dentro de Gestión municipal	7,7%	82,7%	9,6%	100,0%
Total		Recuento	19	124	24	167
		% dentro de Gestión municipal	11,4%	74,3%	14,4%	100,0%

Source: Villa María del Triunfo, 2021.

Figure 5. Frequency distribution between municipal management and solid waste segregation.

			Recolección de Residuos solidos			Total
			Deficiente	Regular	Eficiente	
Gestión municipal	Mala	Recuento	0	6	0	6
		% dentro de Gestión municipal	0,0%	100,0%	0,0%	100,0%
	Regular	Recuento	12	80	17	109
		% dentro de Gestión municipal	11,0%	73,4%	15,6%	100,0%
	Buena	Recuento	10	36	6	52
		% dentro de Gestión municipal	19,2%	69,2%	11,5%	100,0%
Total		Recuento	22	122	23	167
		% dentro de Gestión municipal	13,2%	73,1%	13,8%	100,0%

Source: Villa María del Triunfo, 2021

Figure 6. Frequency distribution between municipal management and solid waste collection

			Transporte de Residuos solidos			Total
			Deficiente	Regular	Eficiente	
Gestión municipal	Mala	Recuento	1	4	1	6
		% dentro de Gestión municipal	16,7%	66,7%	16,7%	100,0%
	Regular	Recuento	15	73	21	109
		% dentro de Gestión municipal	13,8%	67,0%	19,3%	100,0%
	Buena	Recuento	4	42	6	52
		% dentro de Gestión municipal	7,7%	80,8%	11,5%	100,0%
Total		Recuento	20	119	28	167
		% dentro de Gestión municipal	12,0%	71,3%	16,8%	100,0%

Source: Villa María del Triunfo, 2021.

Figure 7. Frequency distribution between municipal administration and solid waste transport

The results show that of the 167 participants, 12 % perceive solid waste transport as poor, 71,3 % as average, and 16,8 % as efficient. Likewise, of the six employees who consider municipal management poor, 16,7 % associate it with poor solid waste transport, 66,7 % with average, and 16,7 % with efficient. Of the 109 participants considering municipal management average, 13,8 % associate it with poor solid waste transport, 67 % with average, and 19,3 % with efficiency. Finally, of the 52 participants who consider municipal management good, 7,7 % associate it with poor solid waste transport, 80,8 % with average, and 11,5 % with efficient.

The results show that of the 167 participants, 10,8 % consider solid waste disposal poor, 78,4 % consider it average, and 10,8 % consider it efficient. Furthermore, of the 6 participants who consider municipal management poor, 100 % associate this with poor solid waste disposal. On the other hand, of the 109 participants considering municipal management average, 11,9 % associate this with poor solid waste disposal, 78,9 % with average, and 9,2 % with efficiency. Finally, of the 52 participants who consider municipal management good, 9,6 % associate it with poor solid waste disposal, 75 % with average, and 15,4 % with efficiency.

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			Disposición final de Residuos solidos			Total
			Deficiente	Regular	Eficiente	
Gestión municipal	Mala	Recuento	0	6	0	6
		% dentro de Gestión municipal	0,0%	100,0%	0,0%	100,0%
	Regular	Recuento	13	86	10	109
		% dentro de Gestión municipal	11,9%	78,9%	9,2%	100,0%
	Buena	Recuento	5	39	8	52
		% dentro de Gestión municipal	9,6%	75,0%	15,4%	100,0%
Total		Recuento	18	131	18	167
		% dentro de Gestión municipal	10,8%	78,4%	10,8%	100,0%

Source: Villa María del Triunfo, 2021

Figure 8. Frequency distribution between municipal management and final disposal of solid waste

Inferential analysis

Normality test

	Kolmogorov-Smirnov		
	Estadístico	gl	Sig.
Gestión municipal	**,104**	**167**	**,000**
Segregación de residuos solidos	**,111**	**167**	**,000**
Recolección de desechos solidos	,180	167	,000
Transporte de desechos solidos	,143	167	,000
Disposición final de desechos solidos	,213	167	,000

Figure 9. Kolmogorov-Smirnov test for the normality of the analyzed data

Ho: the variables and their dimensions have a normal distribution. Ha: the variables and their dimensions do not have a normal distribution.

Significance level: α = 0,05 Decision rule:

If Sig. = p≥ α, the null hypothesis is not rejected. = p< α, the null hypothesis is rejected

Figure 9 shows the conclusions of the Kolmogorov-Smirnov normality test. We assume a significance level of 0,05, which we compare with the significance value shown (Sig.). To this end, all are less than the significance level, which is why we conclude that the variables and dimensions included in the hypotheses do not have a normal distribution. Therefore, we must use the ordinal logistic regression test to test the hypotheses.

Hypothesis testing: General research hypothesis

H0: municipal administration does not influence solid waste segregation in Villa María del Triunfo, 2021.

Ha: municipal administration influences solid waste segregation in Villa María del Triunfo, 2021.

Confidence level: 95 %

Significance level: 5 %, error limit (∝): 0,05

Decision rule: if p-value >= 0,05, Ho is accepted; if p-value <= 0,05, Ho is rejected.

Statistical test: ordinal logistic regression

Regresión ordinal

Modelo	-2 log de la verosimilitud	Chi-cuadrado	gl	Sig.
Sólo intersección	24,074			
Final	20,768	3,305	2	,019

Función de vínculo: Logit.

Source: Villa María del Triunfo, 2021

Figure 10. Logistic regression of the variable solid waste segregation as a function of the variable municipal management

Analysis and interpretation: finding a significance value of p=0,019, which is less than the significance level of 0,05, the null hypothesis is rejected and the alternative hypothesis is accepted, effectively demonstrating that municipal administration influences solid waste segregation in the municipality of Villa María del Triunfo in 2021.

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Pseudo R-cuadrado	
Cox y Snell	,696
Nagelkerke	,527
McFadden	,513

Figure 11. Pseudo R-squared

Specific hypothesis 1

H0: municipal management does not influence solid waste collection in Villa María del Triunfo in 2021.
Ha: municipal management influences solid waste collection in Villa María del Triunfo in 2021.
Confidence level: 95 %
Significance level: 5 %, error limit (∝): 0,05
Decision rule: Ho is accepted if p-value >= 0,05; if p-value <= 0,05, Ho is rejected.
Statistical test: ordinal logistic regression.

Regresión ordinal

Modelo	-2 log de la verosimilitud	Chi-cuadrado	gl	Sig.
Sólo intersección	22,161			
Final	20,154	2,008	2	,037

Función de vínculo: Logit.

Source: Villa María del Triunfo, 2021

Figure 12. Logistic regression of the solid waste collection dimension based on the municipal administration variable

Pseudo R-cuadrado	
Cox y Snell	,712
Nagelkerke	,515
McFadden	,478

Figure 13. Pseudo R-squared

Analysis and interpretation: finding the significance value of p=0,037, which is lower than the significance level of 0,05, I reject the null hypothesis and accept the alternative hypothesis. Therefore, we can conclude that the municipal administration intervened in solid waste collection in Villa María del Triunfo in 2021.

Specific hypothesis 2

H0: the municipal administration does not influence solid waste transport in Villa María del Triunfo in 2021.
Ha: the municipal administration influences solid waste transport in Villa María del Triunfo in 2021.
Confidence level: 95 %.
Significance level: 5 %, error limit (∝): 0,05.
Decision rule: if p-value > ∝=0,05, Ho is accepted; if p-value ≤ ∝=0,05, Ho is rejected.
Statistical test: ordinal logistic regression.

Regresión ordinal

Modelo	-2 log de la verosimilitud	Chi-cuadrado	gl	Sig.
Sólo intersección	22,932			
Final	22,833	,099	2	,095

Función de vínculo: Logit.

Source: Villa María del Triunfo, 2021

Figure 14. Logistic regression of the solid waste transport dimension based on the municipal management variable

Analysis and interpretation: finding a significance value of p=0,095, greater than the significance level of 0,05, means that the null hypothesis is not rejected and the alternative hypothesis is rejected. Therefore, we can conclude that municipal administration does not influence solid waste transport in Villa María del Triunfo in 2021.

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Pseudo R-cuadrado	
Cox y Snell	,559
Nagelkerke	,475
McFadden	,374

Figure 15. Pseudo R-squared

Specific hypothesis 3

H0: the municipal administration influences the final disposal of solid waste in Villa María del Triunfo in 2021.
Ha: the municipal administration influences the final disposal of solid waste in Villa María del Triunfo in 2021.
Confidence level: 95 %
Significance level: 5 %, error limit (∝): 0,05
Decision rule: if p-value > ∝=0,05, Ho is accepted; if p-value ≤ ∝=0,05, Ho is rejected.
Statistical test: ordinal logistic regression.

Regresión ordinal

Modelo	-2 log de la verosimilitud	Chi-cuadrado	gl	Sig.
Sólo intersección	19,838			
Final	18,633	1,205	2	,047

Función de vínculo: Logit.

Source: Villa María del Triunfo, 2021

Figure 16. Logistic regression of the final disposal of solid waste dimension based on the municipal management variable

Pseudo R-cuadrado	
Cox y Snell	,719
Nagelkerke	,697
McFadden	,454

Figure 17. Pseudo R-squared

Analysis and interpretation: finding the significance value of p=0,047, which is less than the significance level of 0,05, we reject the null hypothesis and accept the alternative hypothesis. Therefore, we can conclude that the municipal administration influenced the final disposal of solid waste in Villa María del Triunfo in 2021.

DISCUSSION

After conducting the corresponding research and based on the results obtained using SPSS software to perform a factor analysis, as well as the reliability, the scale, the inferential analysis, and finally the cross Figure, as described by Veazie[30] in his understanding of statistical tests, where he explains the logic of the hypothesis test he presents, we can provide a more precise and more interesting understanding, application, and interpretation.

Cronbach's alpha internal consistency reliability test Soler Cárdenas et al.[31] for the municipal management instrument obtained a coefficient of 0,834, which suggests that the instrument is highly reliable. Meanwhile, Cronbach's alpha internal consistency reliability test for the solid waste segregation instrument obtained a coefficient of 0,803, which shows that the instrument has a high degree of reliability.

Cetrulo et al.[1] mentioned that a case study methodology was applied in Brazil, where a solid waste policy was implemented and a database was made available. An empirical statistical analysis of panel data was carried out to assess whether or not key performance indicators for municipal waste management had improved. The findings suggest that the national solid waste plan has not achieved the desired changes in municipal waste management. In particular, no significant improvement was observed in the indicators studied: municipal waste generation, waste collection frequency, recyclable waste recovery rate, and proportion of landfills. In addition, the document concludes with lessons learned and supports the identification of constraints and strategies that can be extrapolated to other developing countries. This is consistent with our proposal that municipal management directly influences the segregation of municipal solid waste.

Figure 1 shows that of the 167 participants, 11,4 % perceive solid waste segregation as poor, 74,3 % consider it average, and 14,4 % perceive it as efficient. On the other hand, of the six respondents who consider municipal management poor, 33,3 % associate this with poor solid waste segregation and 66,7 % with average segregation. Furthermore, of the 109 participants who consider municipal management average, 11,9 % associate it with poor solid waste segregation, 70,6 % with average, and 17,4 % with efficiency. Finally, of the 52 employees who consider municipal management good, 7,7 % associate it with poor solid waste segregation, 82,7 % with average, and 9,6 % with efficient. These findings are similar to those of Edjabou et al.[32] in ensuring the transparency of percentages. We note that in other countries, there is no total agreement on on-site segregation, as people do not yet fully manage recycling and waste collection, with the regular item predominating as the highest percentage taken from seven Danish municipalities by the author.

Figure 2 shows the results for the 167 participants: 13,7 % perceive solid waste collection as poor, 73,1 % as regular, and 13,8 % as efficient. Likewise, of the 6 participants who consider municipal management poor, 100 % associate it with regular solid waste collection. Of the 109 respondents considering municipal management average, 11 % associate it with poor solid waste collection, 73,4 % with average, and 15,6 % with efficiency. Furthermore, of the 52 participants, 19,2 % associate it with poor solid waste collection, 69,2 % with average, and 11 % with. 5 % with efficiency, as shown by Al-Salem et al.[33] in their article on recycling routes and recovery of solid plastic waste, which shows that waste collection is a practice associated with recyclers and groups that realize the importance of solid waste collection. Recent advances in recycling are also reviewed.

Figure 5 shows that of the 167 participants, 12 % perceive solid waste transport as poor, 71,3 % as average, and 16,8 % as efficient. Likewise, of the six employees who consider municipal management poor, 16,7 % associate it with poor solid waste transport, 66,7 % with average, and 16,7 % with efficient. Of the 109 participants considering municipal management average, 13,8 % associate it with poor solid waste transport, 67 % with average, and 19,3 % with efficiency. Finally, of the 52 participants who consider municipal management good, 7,7 % associate it with poor solid waste transport, 80,8 % with average, and 11,5 % with efficient. In this regard, Paes et al.[34] indicate that municipal management with adequate waste transport leads to better management of municipal administration.

Figure 6 shows that of the 167 participants, 10,8 % consider the final destination of solid waste poor, 78,4 % consider it average, and 10,8 % consider it efficient. In addition, of the six participants who consider municipal management poor, 100 % associate it with a poor final destination for solid waste. On the other hand, of the 109 collaborators who consider municipal management average, 11,9 % associate it with poor final waste disposal, 78,9 % with average, and 9,2 % with efficiency. Finally, of the 52 participants who consider municipal management good, 9,6 % associate it with poor final waste disposal, 75 % with average, and 15,4 % with efficiency. Therefore, Fang et al.[35] conclude in their study that solid waste should be disposed of properly due to its harmful effects on health and that disposal in landfills should be encouraged, a situation that is not fully applicable in our country due to the existence of many municipal dumps.

The results of the normality test (Kolmogorov-Smirnov) are shown in figure 7. We assume a significance level of 0,05, which we compare with the significance value shown. All are below the significance level, and therefore, we can conclude that the variables and dimensions developed in the hypotheses do not have a normal distribution. Therefore, we must use the ordinal logistic regression test for hypothesis testing.

Regarding the logistic regression of the variable Solid Waste Segregation[36] as a function of the variable Municipal Management, we obtained a significance value of p=0,019, which is less than the significance level of 0,05. The null hypothesis is rejected, and the alternative is accepted, effectively demonstrating that municipal administration influences solid waste segregation in the municipality of Villa María del Triunfo, 2021.[37,38,39,40,41,42]

For the logistic regression of the solid waste collection dimension[37] based on the municipal management variable obtained a significance value of p=0,037, less than the significance level of 0,05; therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. We can therefore conclude that municipal administration influences solid waste collection in the municipality of Villa María del Triunfo in 2021.[43,44,45]

Regarding the logistic regression of the solid waste transport dimension based on the municipal management variable[38] obtained a significance value of p=0,095, which is greater than the significance level of 0,05. Thus, the null hypothesis is not rejected, and the alternative hypothesis is rejected. This means that it can be concluded that municipal administration does not influence solid waste transport in the municipality of Villa María del Triunfo in 2021.[46,47,48]

Finally, due to the logistic regression of the final disposal of solid waste as a function of the municipal management variable in Villa María del Triunfo, 2021 Piemonte et al.[39] with a significance value of p=0,047, which is less than the significance level of 0,05, the null hypothesis is rejected and the alternative hypothesis is accepted. Therefore, we can conclude that municipal management influences the final disposal of solid waste in Villa María del Triunfo in 2021.[49,50,51]

This confirms the statement made by Cruz et al.[40] regarding the importance of waste characterization for waste management, as it provides information that helps to understand the scale of production, handling, and

final disposal. Therefore, it is necessary to have a clear understanding of the quantities of waste generated in an area, the various materials that make up the waste, the points of generation, and their variability, due, among other factors, to the nature of the seasons, people's lifestyles, family composition, and environmental culture.[52,53,54,55] This provides a better understanding of the risk of environmental impact at the regional and global levels. It is also important to be aware of the various waste management actions carried out by municipalities, which require effort and coordination between the people responsible and involved in the entire process. Furthermore, we must recognize that no single practice is better than others, so it is necessary to promote a culture of sustainability that incorporates comprehensive management with a range of options from which administrators and decision-makers can choose based on the specific environmental, social, and economic conditions of the locality, in our case, the district of Villa María del Triunfo.[56,57,58]

CONCLUSIONS

First: it was determined that the influence of the municipal administration does impact solid waste segregation in the municipality of Villa María del Triunfo, 2021, with a significance value of p=0,019, which is less than the significance level of 0. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, effectively demonstrating that municipal administration does influence solid waste segregation in the municipality of Villa María del Triunfo, 2021.

Second: it was determined that the influence of municipal administration does affect solid waste collection in the municipality of Villa María del Triunfo, 2021, where a significance value of p=0,037 was obtained, which is less than the significance level of 0. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. We can therefore conclude that municipal management influences solid waste collection in the municipality of Villa María del Triunfo in 2021.

Third: it was found that municipal management does not influence solid waste transportation in the municipality of Villa María del Triunfo, 2021, where a significance value of p=0,095 was obtained, which is greater than the level of significance of 0,05, which means that the null hypothesis is not rejected and the alternative hypothesis is rejected. Therefore, we can conclude that municipal management did not influence solid waste transportation in Villa María del Triunfo in 2021.

Fourth: it was found that municipal administration does influence the final disposal of municipal solid waste in Villa María del Triunfo in 2021, with a significance value of p=0,047, which is less than the significance level of 0. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. We can therefore conclude that the municipal administration does influence the final disposal of solid waste in the municipality of Villa María del Triunfo in 2021.

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CONFLICT OF INTEREST

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