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SHORT COMMUNICATION

Waste classification practices in Peru: An analysis from Villa María del Triunfo and Latin America

Prácticas de clasificación de residuos en Perú: Un Análisis desde Villa María del Triunfo y América Latina

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ABSTRACT

In 2021, municipal management of solid waste classification practices in Villa María del Triunfo represented an ongoing challenge for local authorities. The district, one of the most densely populated in Metropolitan Lima, faced a growing generation of waste without an effective strategy for separation at source. Despite being backed by the General Law on Solid Waste, institutional efforts were limited due to a lack of infrastructure, scarce incentives, weak enforcement and minimal citizen participation. Environmental education campaigns lacked continuity and coverage, which generated mistrust in the population and discouraged household separation. In comparison with other Latin American cities such as Bogotá, São Paulo or Mexico City, the district lagged considerably behind. While these cities implemented formalised recycling systems, recycling cooperatives and educational policies, Villa María del Triunfo relied mainly on isolated initiatives by formal recyclers and NGOs. The COVID-19 pandemic worsened the situation, increasing waste generation and reducing sustainable practices for fear of contagion. However, some local experiences, such as the coordination with waste pickers' associations, showed that it was possible to move towards a participatory and sustainable management model. In conclusion, the case of Villa María del Triunfo reflected the limitations of the Peruvian waste management system but also offered concrete opportunities for improvement if institutional strengthening, environmental education and public investment were enhanced.

Keywords: Solid Waste; Waste Classification Practices; Municipal Management; Recycling; Environmental Education.

RESUMEN

En 2021, la gestión municipal en las prácticas de clasificación de residuos sólidos en Villa María del Triunfo representó un desafío persistente para las autoridades locales. El distrito, uno de los más densamente poblados de Lima Metropolitana, enfrentó una creciente generación de residuos sin una estrategia efectiva de separación en la fuente. A pesar de estar respaldados por la Ley General de Residuos Sólidos, los esfuerzos institucionales resultaron limitados debido a la falta de infraestructura, escasos incentivos, débil fiscalización y mínima participación ciudadana. Las campañas de educación ambiental carecieron de continuidad y cobertura, lo que generó desconfianza en la población y desincentivó la separación domiciliaria. En comparación con otras ciudades de América Latina, como Bogotá, São Paulo o Ciudad de México, el distrito mostró un rezago considerable. Mientras estas ciudades implementaron sistemas de reciclaje formalizados, cooperativas de recicladores y políticas educativas, Villa María del Triunfo dependió principalmente de iniciativas aisladas de recicladores formales y ONG. La pandemia de COVID-19 agravó el panorama, al incrementar la generación de residuos y reducir las prácticas sostenibles por temor al contagio. No obstante, algunas experiencias locales, como la articulación con asociaciones de recicladores, evidenciaron que era posible avanzar hacia un modelo de gestión participativa y sostenible. En conclusión, el caso de Villa María del Triunfo reflejó las limitaciones del sistema peruano de gestión de residuos, pero también ofreció oportunidades concretas de mejora si se fortalece la institucionalidad, la educación ambiental y la inversión pública.

Palabras clave: Residuos Sólidos; Prácticas de Clasificación de Residuos; Gestión Municipal; Reciclaje; Educación Ambiental.

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BACKGROUND

Municipal management of solid waste segregation has been one of the main environmental and public health challenges for local governments in Latin America.[1,2,3,4] In the case of Peru, particularly in the district of Villa María del Triunfo during 2021, this issue took on special relevance due to the growing generation of household and industrial waste, coupled with limited institutional capacity to deal with it effectively. In a context of rapid urbanization and sustained population growth, solid waste management requires transparent, sustainable, and participatory strategies, framed within a public policy that would allow for reducing, reusing, and recycling materials and promoting an active environmental culture.[5,6]

Villa María del Triunfo, located in the southern cone of Metropolitan Lima, is one of the most populated districts and faces significant challenges in urban infrastructure, basic services, and land use planning.[7,8] In this district, daily solid waste generation exceeded 400 tons in 2021, according to municipal reports, of which only a small portion was segregated adequately at the source.[9,10] Most of the waste was disposed of without prior separation, ending up in informal dumps or collapsed landfills, generating negative externalities such as soil, water, and air pollution, as well as direct impacts on the health of residents.[11,12]

One factor explaining the inefficiency in waste segregation was the lack of sustained environmental education campaigns.[13,14] Although specific awareness programs were implemented, they lacked continuity and inter-institutional coordination.[15,16] Separate collection days were sporadic and did not cover the entire district. This generated mistrust among the population, who perceived that the separated waste was ultimately mixed during transport and final disposal.[17,18,19,210,21] This discouraged separating waste at home, even among citizens aware of the environmental impact of their consumption and disposal habits.

In terms of regulations, the General Solid Waste Law (Law No. 27314) establishes that local governments are primarily responsible for the comprehensive management of solid waste, from generation to final disposal. However, the effective implementation of this regulation requires not only political will, but also technical, budgetary, and logistical capacities that many municipalities, such as Villa María del Triunfo, have been unable to consolidate. Added to this is the widespread informality in waste collection services, with the participation of recyclers with no legal recognition or decent working conditions, despite their crucial role in the value chain.[22,23,24,25,26]

Comparing the Peruvian case with other Latin American countries in 2021, several structural similarities and differences can be observed.[27,28,29] In countries such as Colombia, Brazil, and Mexico, although there are challenges related to informality and service coverage, more robust public policies have been developed regarding recycling and waste recovery.[30,31,32] In Bogotá, for example, thousands of recyclers have been formalized through cooperatives recognized by the local government, who carry out differentiated collection on specific routes and receive financial compensation.[33] In São Paulo, Brazil, a network of ecopoints and collection centers has been implemented to enable more efficient and community-based management of recyclable waste.[34,35,36] In Mexico City, environmental education strategies have been incorporated into the school curriculum, generating greater social awareness of the problem.[37,38,39]

In contrast, the Peruvian context, and specifically that of Villa María del Triunfo, has been characterized by weak environmental institutions and low investment in recycling infrastructure. Most segregation programs have depended on international cooperation or initiatives by non-governmental organizations, without a state policy to guarantee their sustainability over time.[40,41,42] In addition, the COVID-19 pandemic has exacerbated the situation by increasing the generation of hospital waste and discouraging household recycling due to fear of contagion.[43] Many families chose to dispose of all types of waste in a mixed manner, which increased the volume of non-recyclable waste and reduced the effectiveness of existing recycling systems.[44,45,46]

Another limiting factor in Villa María del Triunfo was the lack of economic and fiscal incentives to promote recycling and segregation at source. Unlike other Latin American cities where differentiated tariff schemes or recycling bonuses have been implemented, in the Lima district, there was no incentive system to encourage active participation by households and businesses. Furthermore, the lack of enforcement of environmental regulations by companies generating special waste made it difficult to trace these materials and ensure their proper final disposal.[47,48,49]

Despite these limitations, there were local experiences that made a difference. Some formal recycling associations, such as "Recicladores Unidos de VMT," established agreements with the municipality and private companies to carry out selective collection in specific areas. Although limited in scope, these initiatives demonstrated that it was possible to build participatory and efficient management models, provided there was political will and citizen commitment. In addition, environmental education programs were developed in schools, and social media campaigns were launched, which, although they did not have the expected impact on a mass scale, did raise awareness among specific sectors of the young population.[50,51]

A comparison with other experiences in Latin America also made it possible to identify good practices that could be adapted to the Peruvian context. For example, the integration of recyclers into the formal system through the creation of legally recognized cooperatives; the development of basic infrastructure for the storage, sorting, and marketing of recoverable waste; the implementation of legal frameworks that promote extended producer responsibility; and coordination between local, regional, and national governments around a standard environmental policy.[52]

In short, the Villa María del Triunfo case in 2021 reflected many of the structural problems facing Peru regarding solid waste management.[53,54,55] The lack of planning, budget, and citizen participation has limited the effectiveness of segregation policies. However, there were also signs of change, driven by social actors, organized recyclers, and international experiences, offering valuable lessons for designing more effective and sustainable public policies.[56,57,58]

Municipal management of solid waste segregation in Villa María del Triunfo during 2021 revealed serious structural deficiencies that reflect a broader national problem. The lack of infrastructure, incentives, enforcement, and institutional coordination hindered progress toward a sustainable waste management model. However, some local experiences and a comparative analysis of the Latin

American context show that it is possible to move toward more efficient, inclusive, and sustainable management. The key lies in recognizing the importance of environmental education, formalizing recycling, public investment in infrastructure, and multisectoral coordination as fundamental pillars of a comprehensive waste policy. Only then will it be possible to move toward cleaner, healthier, and more resilient cities shortly.

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