

## SOLID WASTE CONTAMINATION IN THE INFORMAL MINING CAMP - LA RINCONADA

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**Yudy Huacani Sucasaca**

Professional School of Economics and  
International Business  
Faculty of Accounting and Financial  
Sciences  
Andean University Néstor Cáceres  
Velásquez  
Juliaca - Peru.  
<https://orcid.org/0009-0008-3275-5586>

**RESUMEN:** El campamento Minero La Rinconada se ha convertido en un foco infeccioso que afecta a la salud de los mismos habitantes quienes residen en el lugar a 5,100 m.s.n.m. en el altiplano peruano. La informalidad de la actividad minera en el Centro Poblado La Rinconada ha originado problemas ambientales con residuos sólidos que son arrojados a los costados de la carretera de acceso por ausencia de una planta de tratamiento y agua potable de calidad. La contaminación de los residuos sólidos es responsabilidad del gobierno y de los hogares que representan la principal fuente generadora de residuos sólidos, las medidas de mitigación se encuentran en el diseño de políticas públicas, formulación de proyectos de inversión pública en saneamiento, residuos sólidos, y planes

de contingencia para reducir los residuos sólidos generados por la minería informal.

**PALABRAS CLAVE:** Residuos sólidos, Minería informal, Campamento Minero La Rinconada.

**ABSTRACT:** The La Rinconada mining camp has become an infectious focus that affects the health of the same inhabitants who reside in the place at 5,100 meters above sea level. in the Peruvian highlands. The informality of mining activity in the La Rinconada Populated Center has caused environmental problems with solid waste that is dumped on the sides of the access road due to the absence of a treatment plant and quality drinking water. Solid waste pollution is the responsibility of the government and households that represent the main source of solid waste generation, mitigation measures are found in the design of public policies, formulation of public investment projects in sanitation, solid waste, and contingency plans to reduce solid waste generated by informal mining.

**KEYWORDS:** Solid waste, Informal mining, La Rinconada Mining Camp.

## INTRODUCTION

The La Rinconada mining camp is informal, it is located in the Janca region, at 5,100 meters above sea level in the La Rinconada Populated Center, the largest in the Ananea District in the Puno region - Peru (INEI, 2017). The growth rate of the La Rinconada Populated Center is 6.6%, it presents a high growth rate since it concentrates inhabitants for a period of working time, these border a total of 60,597, a total of 12,119 homes that do not have any type of sanitation service (water and drainage) and have a terrible quality of life. There is a presence of mining informality that contaminates and dumps abundant waste, where the local authority does not have a budget for the adequate service of solid waste to a dump. And whose solid waste is thrown on the sides of the road.

Although the millennium objectives according to objective 7 are to guarantee the sustainability of the environment, those “people without sustainable access to drinking water and basic sanitation services”. In our country, the Ministry of Energy and Mines in 2018 with the purpose of contributing to sustainable development and the quality of life of the population in rural areas has promoted the “Integral Mining Formalization” program with the support of the Regional Government of Puno , granting authorizations to 900 artisanal miners better known as “pallaqueras” and “cachorreras” from La Rinconada and Cerro Lunar de Ananea, who live in tin houses.

## IMPACTS OF SOLID WASTE ON HEALTH AND THE ENVIRONMENT

Today the increase in the amount of solid waste has become a topic of debate throughout the world (Endalew & Tassie, 2018), with negative impacts on public health, represents a threat to the environment and affects the quality of life of people, (Gebreeyosus, 2018), for this reason it has been considered an environmental problem (Vassanadumrongdee & Kittipongvises, 2018), characteristic of developing countries (Wegedie, 2018) and is an insurmountable challenge due to rapid urbanization and the inability of the authorities to confront it (Mohan, Sinha, & Lal, 2016). This is due to the lack of effective management programs, regulations and policies, waste is causing a serious health risk such as communicable diseases, bad odors, discomfort and environmental impacts, such as water, soil and air pollution ( Verma, Borongan, & Memon, 2016).

## RECYCLING AS AN ALTERNATIVE SOLUTION

In the workshop sponsored by the Institute for Waste Management and Research at the University of Tennessee, they recommend the need to identify trends in state approaches to solid waste disposal, as well as define the location of solid waste (English, Barkenbus, & Wilt, 1993). That is, there is a need to collect solid and classified waste for effective management (Miezah, Obiri-Danso, Kádár, Fei-Baffoe, & Mensah, 2015). This situation is

not unrelated in the La Rinconada Populated Center due to mining exploitation, which has increased the daily rate of solid waste generation, it has a high demographic growth at the urban level, and there are serious solid waste collection problems, since it is not It has a dump, generating an infectious focus of diseases. Currently, in La Rinconada, the reuse and recycling programs are inefficient and are totally abandoned to the elements.

The integrated management of solid waste is a priority issue due to deficient waste management (Zurbrügg, Gfrerer, Ashadi, Brenner and Küper, 2012), since they emit dangerous gases into the atmosphere (Aliyu, 2010), therefore it must be propose recycling and reuse of waste, undertake environmental awareness campaigns to raise awareness of the correct attitude (Aliyu, 2010). Today recycling is a way of life for society in developed and developing economies (Mwanza & Mbohwa, 2017).

In New York City, a plan with a 20-year projection has been prepared since the late 1990s, which included prevention, recycling/composting of waste into energy/ash management and landfill; with different actors such as the Department of Health, the City Recycling Advisory Board (made up of the President of the Municipalities, Mayor and City Council) to ensure public participation in planning and decision-making on solid waste ( Clarke, 1993).

Despite the existence of recycling programs with different interest groups in the government and private sectors to reduce waste generation, a weak and positive correlation has been achieved between community participation in the recycling program and community attitude (Malik, Abdullah, & Manaf, 2015). It is still necessary to promote the articulation of the public and private sectors for the development of sustainable programs with the environment and related to public health (Kinobe et al., 2015), starting with collaborative awareness of these sectors (Joshi & Ahmed, 2016).

## **DETERMINANTS OF SOLID WASTE MANAGEMENT IN THE AFRICAN UNION, ETHIOPIA, THAILAND, VIETNAM, NEW YORK AND INDIA**

In the African Union, the willingness to pay for 350 households to evaluate a solid waste management system in the city of Bahir Dar in Ethiopia is 13 ETB per month, it was shown that the education of the head of the household, the monthly aggregate income, access to solid waste management service, disease outbreak, number of children, and amount of waste generated per week significantly affect willingness to pay a monthly fee (Endalew & Tassie, 2018).

In the Afar Regional State in Ethiopia, the willingness to pay of households to improve solid waste management is linearly related to the factors: age, sex, marital status, level of education in years, family size, availability of children under 10 years of age in the home, state of own home, period of time living in the neighborhood, employment status, average monthly income level of the household. It is emphasized that married people would be more willing to pay than singles, due to the higher income they receive; regarding education, there

is a better payment position when the number of years dedicated to education is greater (Gebreeyosus, 2018).

In Thailand it has been determined that the factors that influence the willingness to pay for the improvement of waste management after having registered favorable records on the preference for recycling programs, with figures still low, are the knowledge of people about waste problems as well as the collection service (Vassanadumrongdee & Kittipongvises, 2018).

In India municipal solid waste management is challenging, it has been generated by rapid urbanization and uncontrolled growth rate, it is difficult to manage the increasing waste without active participation of people, which should be implemented with an integrated approach (Joshi & Ahmed, 2016). The following categories of solid waste are classified: biodegradable waste (food and kitchen waste and green waste such as vegetables, flowers, leaves, fruits), recyclable material (paper, glass, bottles, cans, metals, certain plastics), waste material inerts (dirt, debris), composite waste (waste clothing, plastic waste), household hazardous waste (medicine waste).

## CONCLUSIONS

As in developing countries, solid waste management has been considered the responsibility of the government and households that represent the main source of solid waste generation, such as the La Rinconada mining camp, which are victims of such negative effects. The mitigation measures recommend including the inhabitants within the design of public policies, preparation of public investment projects in sanitation, solid waste, and contingency plans to reduce solid waste generated by informal mining. Greater environmental education should be strengthened, environmental awareness campaigns that should be included in the educational system to promote its reduction, and facilitate urgent solutions (Mohan et al., 2016).

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## ANEXOS



*Photo 1. Panoramic view of the access road to the Rinconada Mine at 5,100 meters above sea level. polluted with mountains of garbage.*



*Photo 2. Garbage is dumped on public roads by the same informal miners throughout the access to the "La Rinconada" mining camp, there is no solid waste service management.*



Photo 3. View of houses scattered one on top of the other, built and roofed with calamine, despite the intense cold that the place presents.



Photo 4. Garbage is not classified and there is no sanitary landfill in La Rinconada, it is an infectious source of diseases.

Let's save the snow-capped La Rinconada!

No to heavy mining pollution!



Photo 5. The snow-capped La Rinconada only offers a view of contamination where one can visit it, there is abundant garbage