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Project #103045: Site d'enfouissement de Mbeubeuss : Étude de l'impact sur la santé humaine à Diamalaye (Malika) utilisant une approche écosanté (Sénégal)

Décharge de Mbeubeuss et santé humaine, étude Ecosanté à Malika/Sénégal : résultats de l'enquête de prévalence et de l'enquête cas-témoins.

Tal-Dia A, Fall C, Ndiaye P, Diongue M, Diagne M, Faye A, Dièye I, Diouf A, Diallo N.T.

L'Institut de Santé et Développement mène une étude pour évaluer l'impact de La décharge de Mbeubeuss, seul dépotoir d'ordures de la région de Dakar sur la santé des populations riveraines et des récupérateurs. Les objectifs sont d'estimer la prévalence des problèmes de santé, d'Identifier les liens entre la décharge et les pathologies observées afin de proposer un programme de santé axé sur l'approche écosystémique de la santé humaine.

La méthodologie basée sur une approche transdisciplinaire a impliqué des chercheurs, des responsables du Ministère de la santé, des représentants des communautés concernées et des gestionnaires de la ville de Dakar. Les études épidémiologiques comprennent trois volets : une étude de prévalence, une étude de cas-témoins et une étude exposés/non exposés. Les populations à l'étude sont celles qui vivent sur la décharge et y travaillent ; celles qui ne vivent pas sur la décharge mais y travaillent et les celles qui vivent les quartiers sur ou autour de la décharge, mais travaillent ailleurs.

Ainsi 1170 personnes dont 17.44% de récupérateurs et 54.17% d'hommes et une moyenne d'âge t de 23.54 ans ont été enquêtées. La durée moyenne de séjour dans la zone d'enquête variait de 4.07 ans à 13.28 ans. La durée moyenne de travail sur la décharge était de 8.86 ans. Les déchets ménagers (36.09%) et industriels (29.62%) ont été les plus manipulés. Seuls 6.48% travaillaient avec une tenue de protection complète, 66% se lavaient correctement les mains avant les repas. Les principales maladies sont respiratoires (14.87%), intestinales (9.06%), dermatologiques (8.38%) et bucco-dentaires (8.12%). Les femmes ont présenté des antécédents d'avortements (72.97%) et de mort-nés (22.52%).

L'enquête cas/témoins a mis en évidence un lien entre la présence d'un problème de santé et le séjour à proximité de la décharge, dans les quartiers Baol, Gouygui, Darou Salam et Diamaguène, notamment plus d'avortements.

Les liens avec la décharge seront approfondis et précisés une enquête exposés- non exposés. Des programmes pilotes sont actuellement en cours.

Mots clés : Ecosanté, Décharge, ISED, Sénégal

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Etude de l'impact de la décharge de Mbeubeuss sur la santé humaine à Malika (Sénégal) : Une approche Ecosanté

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L'urbanisation accélérée de la région de Dakar, associée à la mauvaise gestion des déchets, fait de cette décharge, seul lieu d'élimination des ordures, une véritable bombe écologique.

L'étude ECOSANTE avait quatre objectifs :

- Estimer la prévalence des problèmes de santé ;
- Analyser les représentations socioculturelles des impacts de la décharge sur les conditions d'existence et le cadre de vie ;
- Identifier les liens entre la décharge et les pathologies observées auprès des populations riveraines incluant les récupérateurs, en particulier auprès des femmes et des enfants ;
- Proposer un programme de mitigation des problèmes de santé identifiés.

L'approche, transdisciplinaire et axée sur le genre, a impliqué chercheurs, praticiens de santé publique, communauté et gestionnaires de la santé. Les chercheurs étaient de l'Institut de Santé et Développement (ISED), l'Institut de Gestion Urbaine (IAGU) et d'autres institutions partenaires.

Les praticiens étaient des responsables du Ministère de la santé au niveau opérationnel : médecin chef de district, sage femme, infirmier. La communauté était représentée par les responsables de mouvements associatifs (groupements féminins, groupements d'intérêt économique, associations sportives et culturelles, leaders d'opinions, tradipraticiens).

La préparation a nécessité deux ateliers participatifs : un d'information et un méthodologique, et un lancement populaire.

La recherche comprenait trois volets : étude de prévalence, étude « cas-témoins » et étude « exposés/non exposés ».

Les populations à l'étude étaient de trois catégories : celle qui vit sur la décharge et y travaille ; celle qui ne vit pas sur la décharge mais y travaille ; et celle qui vit sur ou autour de la décharge mais n'y travaille pas.

Les données ont été recueillies grâce à des interviews, un examen clinique et des examens paracliniques. L'analyse a été faite à l'aide des logiciels : Epi-info, R et SAS.

Cette approche a associé population, chercheurs et techniciens de santé dans une même équipe.

Mots clés : Ecosanté, décharge, Mbeubeuss, ISED, Sénégal

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Prévalence des complications de la Santé Reproductive des femmes vivant dans l'environnement de la décharge de Mbeubeuss au Sénégal.

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Introduction

La santé de la reproduction des femmes est une préoccupation majeure dans les villes de nos pays en développement. Mais elle reste menacée par les mauvaises conditions de vie liées surtout à l'environnement. C'est ainsi que ce travail dont l'objectif est d'étudier la prévalence des complications de la Santé Reproductive des femmes vivant dans l'environnement de la décharge de Mbeubeuss a été mené.

Méthodologie

Une enquête transversale a été réalisée en juillet 2007 sur un échantillon de 1170 personnes, dont 319 femmes âgées d'au moins 15 ans. Des interviews directes ont été menées auprès de ces femmes à l'aide d'un questionnaire portant surtout sur : leur nombre d'enfant vivant ou décédé ; leur état sanitaire actuel et leurs antécédents gynéco-obstétricaux. Une démarche participative, impliquant les populations, les récupérateurs, l'équipe de recherche, les gestionnaires de la ville et mettant l'accent sur l'approche genre sensible a été utilisée.

Résultats

Parmi les 319 femmes étudiées, il y avait 47% de non instruites ; 55,8% de mariées dont 58,9% dans un régime polygame. La moyenne d'âge était de 32,9 ans avec des extrêmes de 15 à 86 ans. Les tranches d'âges les plus représentées étaient : 15-24 ans avec 35,1% et 25-34 ans avec 23,1%. ; 34,8% des femmes ont présenté des problèmes gynéco-obstétricaux. Les principaux problèmes retrouvés ont été : l'avortement (72,97%), les mort-nés (22,52%) tandis que les malformations ont été retrouvées chez 0,9%.

Au total, les femmes fréquentant la décharge ont un risque 7 fois plus élevé de faire un avortement que les femmes ne la fréquentant pas.

Conclusion

Le lien des problèmes identifiés avec la décharge sera complété par des enquêtes cas/ témoins et exposés non exposés.

Mots clés : Décharge, Écosanté, Santé de la reproduction, ISED, Sénégal

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Étude de l'impact de la décharge de Mbeubeuss sur la santé humaine a Diamalaye II (Malika) dans la banlieue de Dakar (Sénégal) une approche écosanté

Introduction

L'urbanisation accélérée de la région de DAKAR pose le problème de la gestion des ordures ménagères. La décharge de Mbeubeuss, seul lieu d'élimination des ordures, est une véritable bombe écologique.

L'ISED en partenariat avec L'IAGU mène une étude ECOSANTE financée par le CRDI afin d'évaluer l'impact de l'environnement de ce vaste dépotoir à ciel ouvert sur la santé des différentes catégories de populations (riveraines et récupérateurs). Les objectifs sont d' Estimer la prévalence des problèmes de santé, d' Analyser les représentations socioculturelles des impacts de la décharge de Mbeubeuss sur les conditions d'existence et le cadre de vie, d'Identifier les liens entre la décharge de Mbeubeuss et les pathologies observées auprès des populations riveraines incluant les récupérateurs, en particulier auprès des femmes et des enfants et enfin de Proposer un programme de santé axé sur l'approche écosystémique de la santé humaine.

L'étude s'insère dans le cadre global d'un vaste programme prenant en compte l'impact de la décharge sur l'environnement, la santé, les ressources agricole et animalière, et les aspects économiques des populations concernées.

Pour atteindre ces objectifs, nous avons utilisé une approche méthodologie novatrice basée sur la transdisciplinarité dont la description est l'objet de cette présentation.

Méthodologie

Cette approche écosystémique à la santé humaine ou Eco santé implique la participation de divers acteurs. L'équipe de pilotage du projet est formée par les chercheurs de l'Institut de Santé et Développement et par des chercheurs provenant des institutions partenaires de recherche, des responsables du Ministère de la santé au niveau opérationnel comprenant le médecin chef de district sanitaire, la sage-femme de la maternité et l'infirmier chef de poste de Malika, des différentes catégories de la communauté de Malika représentée par les responsables de mouvements associatifs notamment les groupements féminins, les groupements d'intérêt économique, les associations sportives et culturelles, les leaders d'opinions (marabout, chef de village et délégués de quartiers), les personnes âgées, les (tradipraticiens...)

Les études épidémiologiques comprennent trois volets : une étude de prévalence transversale, une étude de comparaison cas-témoins et une étude exposés/non exposés.

Les populations à l'étude et l'échantillon qui en sera tiré sont les suivants : Les populations qui vivent sur la décharge et y travaillent (hommes, femmes, enfants et personnes âgées) ; les populations qui ne vivent pas sur la décharge mais y travaillent (récupérateurs, restauratrices,

camionneurs, acheteurs) et les populations qui vivent à Diamalaye II et à Malika et ne travaillent pas sur la décharge et **des populations qui vivent en dehors de la zone de la décharge.**

Résultats

Les nouveaux résultats obtenus ont permis de préciser les liens entre les pathologies et la décharge grâce à une étude Exposés non exposés et d'identifier les facteurs causals de ces pathologies grâce à une étude cas témoins.

Conclusion

Des projets pilotes de mitigation sont en cours.

Project #103605: Mastering Sanitation in an Urban Ecosystem in Yaounde

Pre-collection of domestic waste in slum districts of Yaoundé: socio-economic and sanitary impact

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Abstract

In developing countries, the management of solid waste constitutes one of the main challenges of the present decade. A pre collecting pilot operation taking solid waste from individual households to municipal bins was implemented at Melen in Yaoundé.

The methods used for the preparation of this operation included meetings between project partners to agree on project objectives and implementation, the identification and interviewing of key actors, conducting a population census and an assessment of the waste generating activities in the targeted area, documenting research, meetings for information sharing and discussion with the inhabitants and the mapping of potential waste collecting itineraries in the targeted areas.

By the end of the first year of investigation, we identified the actors of waste management and the services they offered, identified the youth associations capable of waste collection process implementation, and assessed the population's ability to finance collection the cost of which varied between US\$1.25 and US\$5 per month. In addition, we noticed that 81% of the households were ready to pay for the pre collection of their waste. The project team endeavoured to create an environment that supported dialogue among various actors enabling follow-up and supervision of the process on the field. The assessment of the first 5 years of the waste program has proven the commitment of the inhabitants to participate in this type of operation through the direct payment for the service: 40 % of the targeted households continued to pay for the pre collection service. The total contribution collected is about US\$7,750 per year that permits the employment of 8 persons.

This operation collected 22.4 tons of waste per month between 2002 and 2007, waste that would have been otherwise thrown into the streams, directly improving the environment and the population's health in these quarters.

Key words: pre collection, domestic waste, participation, funding, Yaoundé.

Introduction.

In the cities of the developing countries, the management of domestic waste absorbs from 40 to 50% of the councils budget. The cities are often deprived of financial and human means, often receive subsidies from the State for recruiting national or multinational private companies which can assume the management and the exploitation of this field. In this context, the efforts are related to collection of waste and their evacuation out of the urbanized part of the city. Very few studies are carried out in view of eliminating without any danger waste and in this context the

ventilations, are only "dump" allowing the transfer of pollution from the urban centre towards the rural surroundings.

In this study, we went from the assumption to which waste produced in slum districts of Yaoundé and peri-urban areas cannot be collected by using trucks, therefore from the above mentioning, they can only be collected through the system of collection and waste treatment put in place on the global level in Yaoundé. In the beginning of this action, the following assumptions were formulated:

1. It is possible to mobilize the participation of the population living in the non-accessible areas to the organization of a not motorized collection of household waste in their quarter;
2. It must be possible to put in place a dialogue environment at the level of the city, allowing implementing dialogue between the various actors: field actors, local authority and private service provider.

In the beginning, the objectives were: (1) improving the rate of supply of domestic waste services collection in slum districts, (2) to create a dialogue framework and complementarities between the small local operators and the company ensuring the collection of waste at the level of the town and (3) finally ensuring the durability of the operation thanks to the contributions of the recipient households and other interested actors.

The different actor involve in this research activities are:

- ERA – Cameroon, is a national NGO conducted de feasibility study in order the put in place de pre-collection of waste in Melen quarter and peripheral quarters in Yaoundé;
- Tam Tam Mobile and GIC JEVOILEC are two local operators. They conducted pre-collection activities in Melen quarters and in the peripheral quarters of Yaoundé 6 sub-divisional council;
- ENSP try to see the impact of the pre-collection on the heath and contribute to the extension of this activities in the mingoa area;
- Yaoundé City Council and Yaoundé 6 sub-divisional Council bring institutional support to the local operators;
- HYSACAM is a international Group who have the contract with Yaoundé urban Council to collect domestic waste in Yaoundé.

I/- Context of the project.

The period between 1991 and 1998 was considered as a period of hesitation in Yaoundé marked by the end of the State's subsidy of the service of waste collection. The private company at that time which was ensuring the collection and evacuation of waste in the town put an end to its service, allowing a global critical situation. In 1998, the waste collecting service was launched thanks again to a financial subsidy from the State and the financial contribution of the Yaoundé city council. In this context, a pre - collection of domestic waste in five slum districts pilot operation was initiated by the NGO ERA – Cameroun and carry out on the field by two small private operators (Tam Tam Mobile and GIC JEVOILEC). The participation of the council and the Yaoundé city council in this operation was not much considerable. The private company ensuring the removal of waste in the city, although it recognizes that the pre - collection had allowed it to increase the quantities collected, that is, their sales turnover, supports the operation

at its strict minimum, by allowing the access to their bin by the pre - collection operators in order to dump there, waste collected from households. The system, even though it is recognized useful by the council authorities survives only thanks to the voluntary participation of the selected quarters households, thus the difficulty of the self management of the operation.

II/- Methodology of the pilot phase implementation.

II. 1/- The action preparatory phase.

The methodology adopted to achieve the goals of this project during the preparatory phase which had lasted only a year included four different but complementary steps:

Coordinating meetings between the local partners: the local partners of this project are much diversified, thus the need to organize activities so that each one can fully play its role. A steering committee brings together: researchers support NGO, the Yaoundé 6 council, “HYSACAM” and the Yaoundé city council each three months. Sensitizing and information meetings for the inhabitants each month have been organized six months before the beginning of the intervention. The population individual headcount and activities have been carried out in order to have a credible data base for the calculation of the level of waste concerned and possible awaited contribution from the population compared to waste, etc.

Individual headcount of the population and activities of the pilot quarters: An individual headcount of the population belonging to the pilot quarters was necessary to have a reliable data base on the potential number of people interested to the project, the future customers of the pre-collection service who shall be proposed. This activity concerned about 2961 households in six quarters.

Investigations and interviews have allowed identifying the pre collection operators, interviews have been done with the key actors (quarter heads, associations, SME of the sector, etc.) on the role to be played in the operational phase of the project. In addition, documentary researches have been carried out for identifying similar experiences in other countries. This step ended up with the identification of the physical constraints of implementation of the pre collection operation in quarters (accessibility, density of houses, relief, etc). A study related to the agreement to pay, costs opportunities, behavior of the population towards waste, etc.

Participative identification of the pre-collection itinerary with the recipient population, cartography of the channel and the main dumping areas defined in conjunction with the council authorities and the service provider company in charge of collecting waste in Yaoundé.

II. 2 /- Before the beginning of the action on the field.

At this level, the activities include:

Drafting of an analytical classification, in view of choosing small operators¹ who shall be implied in the project. From the synthesis of discussions with various operators, ten criteria²

¹ Some of this small operators are local association without experience with the waste pre-collection activity. Some are small enterprises.

have been defined in order to choose the most relevant actors who shall be put into contribution in the realization framework of this project [Zarhani Fouad et al., 2006]. The application of these criteria to our data base of the 21 interviewed associations made it possible to preselect five actors ready to take part in the operational phase of the project. After analysis, two operators have been choosing to intervene in the project: they included GIC JEVOLEC for the two peripheral quarters and Tam Tam Mobile for the three main quarters in Melen.

Staff training for the operators and the provision of work materials to the selected operators. The taking into account of the wages of the personnel and operating expenses during the first 3 months;

Drafting of service specifications in conjunction with the population, the council and the Yaoundé city council. The definition of the service price compatible with the incomes of the inhabitants and the level of service was based on of results of the study on willingness to pay.

II. 3/- During the operational phase.

II.3.1/- the creation of a steering committee defining the missions of the various actors.

The Yaoundé city council should: settle possible disputes between the service providers and “HYSACAM” choose the site of the relay bins in which will be stored waste transported by the pre collection service providers, approve the specifications of the service providers.

The Yaoundé VI sub divisional council should: take regulatory measures to let the households who do not take part in the project know that they should not to continue to dump waste in the inappropriate places, animate the discussion climate which is a dialogue space between the various actors engaged in this project, approve the specifications of the service providers.

Era-Cameroun has coordinated the implementation of the pilot operation in the quarters. The specific tasks realized during the operational phase of the project by ERA-Cameroun included: preparation of the specifications of the service providers, technical and financial follow-up of the pre-collection operation, sensitization of the population, support of the operator for drafting strategy for recovering the contributions.

The pre collection operators (Tam Tam Mobile and GIC GEVOLEC) should ensure the pre collection according to the specifications fixed by all the actors, collect the financial contributions of the recipients, maintenance and cleaning of the relay vats surroundings, sensitize the recipient households

HYSACAM, as a private company is in charge of collecting waste and their removal to the Nkolfoulou landfill, along a well identified channel. HYSACAM had the following tasks: the choice of the relay bins site and their equipment, the participation in the dirt cleaning campaign in the quarter, by the provision of rolling material (truck, charger), approval of the specifications of the service provider, the removal of the relay bins and their transportation into the landfill.

See the D05 action report; Programme “Sustainable waste management and town sanitation” Diffusion Programme Solidarité Eau(www.pseau.org) and Partnership for Town Development (www.pdm-net.org).

Residents are represented in the stirring community by the chief of the different quarters cover by the pre-collection activity and the representative of key association. They have to make pre-collection service available to all the population of their quarter and sensitize people to pay for the service.

II.3.2/- Integration and participation of the recipient population.

At the end of the various meetings organized in the pilot quarters, the following basic principles have guided the action on the field: any household is free to give its waste to the pre collection service provider, the committed household will pay the service provider in exchange to the pre-collection service³ rendered to him, the household who refuses to entrust his waste to the service provider is held to remove them itself and not to pour it in rivers, gutters and in landfills.

To ensure itself of the functionality of these basic rules, the population at each level of the quarter has set up its local relay structure of five members whose role has consisted to: make sure that the recipient household pays the agreed contribution to the service provider, to make sure that the service provider regularly removes waste, settle possible disputes existing between the service provider and his customers, propose sanctions the households who dump waste at unauthorized areas by the Yaoundé 6 sub divisional council hygiene service, so that it takes discipline sanctions against them according to the regulation in force. The development committee existing in the quarter when its dynamism is recognized by the population can play this role of relay structure. The quarter head in advance is considered as guest member of this committee where the entire population existing in the quarter shall be represented (women representative associations, youth, heads of blocks, notables and economic operators).

III/- results obtained.

We will separate the results obtained during the operational phase⁴, one year after the end of subsidies, and five years after the end of subsidies.

III.1/- results of the operational phase.

a/- a true partnership between the pre-collection operators and the collection company.

The various organized meetings have enhanced to achieve certain goals especially [Era – Cameroun, 2002]:

- Drafting of a true partnership between HYSACAM and the service providers in charge of the execution of the pre collection operation. HYSACAM equip different point choice by the local operator and valid by the Yaounde City Council by trucks and transport all waste collected by the operator in Nkolfoulou dump site (figure n°1).
- HYSACAM is the only professional company dealing with the collection of solid waste in Yaoundé. The relations between the Management of this company and small operators dealing also with solid waste were not smoothly functioning. They were full of prejudices and incomprehension. This relation improved considerably thanks to the project, in such

³ The local operator take waste in any household engaged in the operation, transport in the truck put in place by HYSACAM.

⁴ During the support period by the MAE

a way that the staff of the company is ready to continue with this partnership because it presently realizes that the two actions are complementary.

- A "gentleman agreement" currently existing between this company and the service provider in charge of the pre collection, in such a way that the company avoids ensuring the door to door collection of the pre collection operators' action areas. It puts its vats at the disposal of the service providers for storing waste it transports to the landfill.
- The volume of waste collected by HYSACAM has increased to 30% at Melen 3 and 4 and to 100% in Mbenda (peripheral quarter).
- At the end of the operational phase ⁵ a direct relation exists between HYSACAM and the service providers. The latter directly inform HYSACAM of the problems within its competence.

Figure n°1: map of the distribution of pre-collection itinerary in Melen

The official acknowledgement of the work by the council authorities. The sub divisional council mayors and the government delegate have acknowledged the pre collection operation, the people who carry out the works on the field and are ready to collaborate in searching for solutions for the durability and the replication of this operation in other quarters in Yaoundé.

b / - Considerable financial participation of the population.

In whole, the number of households ready to pay for the pre collection service has considerably increased before and after the pre collection action on the field. The most significant increase is observed in Melen IV where we went from 51% before the intervention to 87% one month after the effective launching of the project. In Melen III the increase is only 18, 6% in the sense that we passed from 55% of intention to pay to 73.5% one month after the launching of the project. The increase in Mbenda still remains very low because we went from 59, 6% of intention to pay to 61, and 5% after the launching of the operation (figure n °2) [Era – Cameroun, 2002]. But with time, we notice that this households' keen interest is precarious and will not last.

Figure n°2:

We notice a reduction of the amount of the agreement to pay (ATP) for the pre-collection waste service. The greatest variation is observed in Melen III where we pass from an average of 1280 FCFA per month before the intervention to 600 FCFA per month afterwards. This phenomenon can be explained by the fact that the amounts proposed before the intervention did not really reflect what the household can pay. In fact, before the intervention, the majority of the households did not believe in the effectiveness of the operation and some proposed amounts just to please the investigators. After the operation, all the households become conscious that the service will be paying and the tendency is to propose low amounts so that the service should not be expensive to them [Era – Cameroun, 2002].

Figure n°3:

Even if more than 80% of the surveyed households are willing to financially take part for the survival of the project, there exists a part of the surveyed households who manifest their reticence.

⁵ Period of support by the French Ministry of Foreign Affairs covering the 2000 to 2002 period.

The pre-collection channel has been organized in the quarter and was charted in conjunction with the participation of the inhabitants. The intervention perimeter in Melen envisages six collection sectors employing 13 young people who serve 995 households just for the Melen 3&4 sector, having a global population of 6 000 inhabitants. The work schedules are fixed in conjunction with the population and an invoicing service is set up by the pre-collection operator. Three rates are proposed according to the results of the study of the agreement to pay and after consultation of the various populations present the project area:

- a special rate for students living alone fixed at 100 FCFA per month;
- a rate of 500 FCFA per month for households of not more than 3 people;
- a rate of 1000 FCFA per month for households of more than 3 people.

III .2/- Assessment of the operation one year after.

a/- socio- economic assessment.

On the socio – economic level, several results are still capitalized:

Tools for action: a detailed pre-collection feasibility study has led to the creation of several essential tools for the analysis of the implementation of this type of operation in other cities of Cameroun: a choice of the operators based on the important criteria which have demonstrated their reliability in time, an assessment of the agreement to pay by the population which has been consolidated on the field and allows the definition of rate approved by all, specifications intervention of the service provider approved by the users on the one hand, the local authorities and private operator in charge of collecting waste, an analysis of similar experience feedback in other world underdeveloped countries allowing to anticipate possible blockings [Tanawa &Ngnikam, 2004];

Dialogue between the actors reducing with time: the experience done here has showed that to avoid inhibitions and incomprehension between actors, spaces for fruitful dialogue, mediation and negotiation are necessary in order to settle disputes and to promote harmony between different components of the population. This is possible only if each actor plays his role and brings a support to the committed operation [Anonymous, 2004]. With time, we have observed the reduction of commitment by the local authorities on the one hand who do not fully mobilize themselves for the promotion of this type of project because of budgetary constraints. In fact, according to the statement from the Yaoundé city council, if the pre-collection is organized in all the slum district of the city, that would involve an increase from 20 to 30% of the quantity of waste to be collected and transported to the landfill. The council budget cannot support such an increase. The private collection operator present in the city sees in this type of operation a competition which does not pronounce itself. According to him, if the pre-collection must be organized in the city, it would be necessary to integrate it in the specifications so that it continues to perpetuate the monopoly situation.

Complementarity between pre collection and collection: pre-collection (i.e., collectors taking waste from households to public places) makes it possible to get in inaccessible areas by garbage trucks so as to bring it till the collecting areas. In Melen, the operation has made it possible to remove from the quarters, 3 tons of waste per day, which would be thrown in gutters, rivers and caused various harmful effects. Hysacam has acknowledged an increase of 30% of waste collected in Melen.

A passion of the served households in spite of the reduction of customers: The number of served households passed from 995 at the launching of the operation (free phase) to 400 from the first month of the contribution and 300 at the end of the first year [Tanawa and Ngnikam, 2004]. This reduction was not entirely translated on the quantity of waste removed because of the households which under rent their subscription to the neighbors. This operation allows removing 3 tons of waste per day and employs 13 persons at the end of the first year. Despite everything, 95% of the households belonging to this area are satisfied with the operation at the end of the first year.

b/- On the financial level.

The pre-collection financial viability is blocked because of the households low payment capacities. The financing based on a direct fee from the users is insufficient to cover the operating costs. The annual balance sheet of the operating statement of the waste pre-collection operation at Melen in Yaoundé is negative. This situation had already been envisaged by the results of the feasibility study. The global deficit combined at the time of the first year of the action was 408 140 FCFA (622,20 €). This deficit was filled in during the period thanks to the external subsidies. An external support to the financial effort of the users is essential to last this type of operation. However, we have noted that the number of customer during the year varies according to the period of the school holidays; this has a significant influence on the incomes (figure n°4) [Tanawa and Ngnikam, 2004]. This project cannot be financially viable with only the financial participation of the local population.

Figure n°4.

In order to last the action with time, the operator has been obliged to adjust the manpower and reduce the training rate. This adjustment has a limited impact on the quality of service for the customers, on the other hand the renewal of the garbage collectors small protection equipment, and the pre-collection materials could not be assured any more.

III. 3/- Assessment of the operation 5 years after.

a /- On the economic socio – level.

This action demonstrates that pre-collection, as a “traditional” activity bringing together working force, has its place in the channel of waste management in a large city and that it can allow, in long term and on a basis of new financing mechanisms, to considerably increase the covering rate of the service of waste collection. We note that the state of hygiene in the quarters which have benefited from this operation is considerably improved compared to the other quarters located in the basin. In spite of the financial problems, we strongly believe that this project is an initiative to be generalized and to last it in the basin. In fact, among the conditions having contributed to reduce the participation of the inhabitants in the project, we have listed internal and external factors in the quarters. Among the external internal factors in the quarter, we quote:

The limit covered by the project: there are no physical limits between the two quarters of the basin, the fact that the inhabitants located apart from the zone of project continue to throw their

waste in the drains, reduced the efforts of those who take part in the operation. This problem of limit is very clearly observed along the drains located at the limit of the covered quarters and the Mingoa River which are the natural limit between Melen III and IV quarters and Elig Effa quarter located on the other catchment. The taking into account of the catchment area, as territorial limit of such an operation can contribute to reduce the differences between quarters and to encourage the whole of the inhabitants to take part in the project.

Lack of institutional support at the local level and the council: if the role of the city council and the Yaoundé VI sub divisional council has been clearly defined and agreed in the beginning of the operation, it was noted that these actors do not show any keen interest to support this type of operation. One of the reasons evoked by the city council, it is that in case of generalization of pre-collection in the town, it would be unable to pay the invoice to Hysacam following the increase in tonnage of waste removed. Thus the laxity behavior leading the operation to function by its own means and even dies if necessary. This lack of keen interest from the authorities brings out the problem of equity in the access to the public services. Households considered as rich located in structured quarters near tarred roads in the basin, their waste is removed without any financial constrain, meanwhile, the poor households located in the half-slope and hollows, do not profit from any assistance, even if they are ready to pay fees for collecting their waste till the large dustbin located on the tarred roads accessible by trucks. The support needed from the council is far to a financial one. It was expected that the council plays a key role in hygiene supervision by convincing the households refusing to adhere to the project to go and throw their refuse in the vats. According to the president of the association Tam Tam mobile, "the inhabitant does not know to whom he shall address his complain in case of misbehavior from his neighbor. We receive complaints and we limit ourselves to sensitizing ". Traditional chief and the CAD⁶ do not want to be also involved in sensitizing the inhabitants; they prefer keep quiet in case of a misbehavior from the inhabitants because of the neighbors' sensitiveness. Each person prefers not to have a useless conflict with his neighbors because of dirtiness. Nevertheless, the quarter's heads and the CAD intervene when they realize that the behavior of an inhabitant can hamper the smooth functioning of the project. In Melen IV for instance, an inhabitant having accused a garbage collector to have stolen his cell-phone was sanctioned by the quarter assembly to pay an amount of 50 000 FCFA to the garbage collector falsely accused for character assassination. A warning was addressed to the inhabitant by the community to have wanted to vandalize a Community project in the quarter. The community during the quarter assembly came together on this occasion like a popular court has seized the opportunity to address their congratulation to the association and mentioned the importance of this project which ensures cleanliness in their quarter.

b/- Financial assessment.

On the financial level, the pre-collection operation balance remained precarious for all the period. With the withdrawal of the donor, only the recipient population continued to pay for the functioning of the service in their quarter. The positive result of the improvement of hygiene and sanity conditions in the demonstration area constitutes the only motivation factor for the inhabitants. This dynamism strongly relied on the will and commitment of the members of the Tam Tam Mobile association leading the operation on the field. To adapt to the precariousness of

⁶Comité d'Animation au Développement du quartier.

the financial incomes, the association has reduced its staff from 13 to 7. The supervisor works part-time and in a voluntary way. Instant assistance from ERA – Cameroun as far as small equipment (boots) is concerned allows when they come to raise the treasury of the operation. Fees for the renewing the work materials is too expensive (for instance 107 000 FCFA of cash deficit in October 2004 (figure n° 5), following the renewal of work uniforms, transportation bags and other small equipment) [Ngnikam and Tanawa, 2006].

Figure n°5:

According to the Tam Tam Mobile president, "the association supports the addition fees while deducting from the profits realized in its connate activities, by solidarity to the members who work in the project and especially also thanks to the concern of the population who has yet acquired good reflexes and favorable behaviors". On the whole of the period from September 2004 to August 2005, the pre-collection operation has cumulated a deficit of 192 280 FCFA, the most overdrawn month being October 2004. This deficit is due to the purchase of the garbage collectors uniforms and renewal of bags useful for storing waste before transportation. January 2005 and December 2004, thanks to the support in small equipment brought by the Environment and Science of Water Laboratory (purchase of boots and small work equipment) has had a meager improvement in the project treasury.

C/- Environmental and medical Assessmen

On the environmental level, this operation makes it possible to remove 22.4 tons of waste from households to public sites each month which would have been dumped in gutters or burnt in open air. It also contributes to improve health and well-being of the inhabitants living in the project area. This operation has created an opportunity for dialogue between local authorities, private company, researchers and small waste pre collection operators. In 2008, that is 7 years after the implementation of the operation, the opinions of the populations of the recipient quarters are still positive on the level of improvement of health and environment of their quarter (figure n°6) [Yumgno O A.L, 2008].

Figure n°6:

In the project area, the population is unanimous on the positive impacts of the project. In fact, the project has permitted to reduce: floods, mice and cockroaches in the houses, child labour (80 to 90% of favorable opinion), heaps of dirt in the quarters. In addition drains and rivers are very clean.

Conclusion

The success of the pre-collection-missing specification at the beginning of the paper in our cities of under developing countries is ultimately a matter of partnership between the emerging actors and the structures in charge of ensuring collection and transportation of waste in the city. If this partnership is not clearly understood by all, it will become difficult to achieve the goals pursued as far as town cleanliness is concerned. The participation of the users and the council in this partnership is indispensable for, it is necessary to create landfills, paying the service providers and ensuring the follow-up of the quality of the service. The pre-collection came to birth in an inexperience city and has found a request from households. In 2007, thanks to a support from

UNDP, this operation was extended in 12 quarters in the catchment area. The follow-up of the activities of the project after the extension will in the end consolidate the results obtained in this action realized only in 2 quarters and define all the elements necessary to a changing of scale. The benefit on health in general and the population's well-being is perceptible. The strong implication of the recipient population, coupled to an important mobilization of the pre-collection operator has permitted to the action to currently exist almost ten years without external contribution and in spite of the non-important implication of the council authorities.

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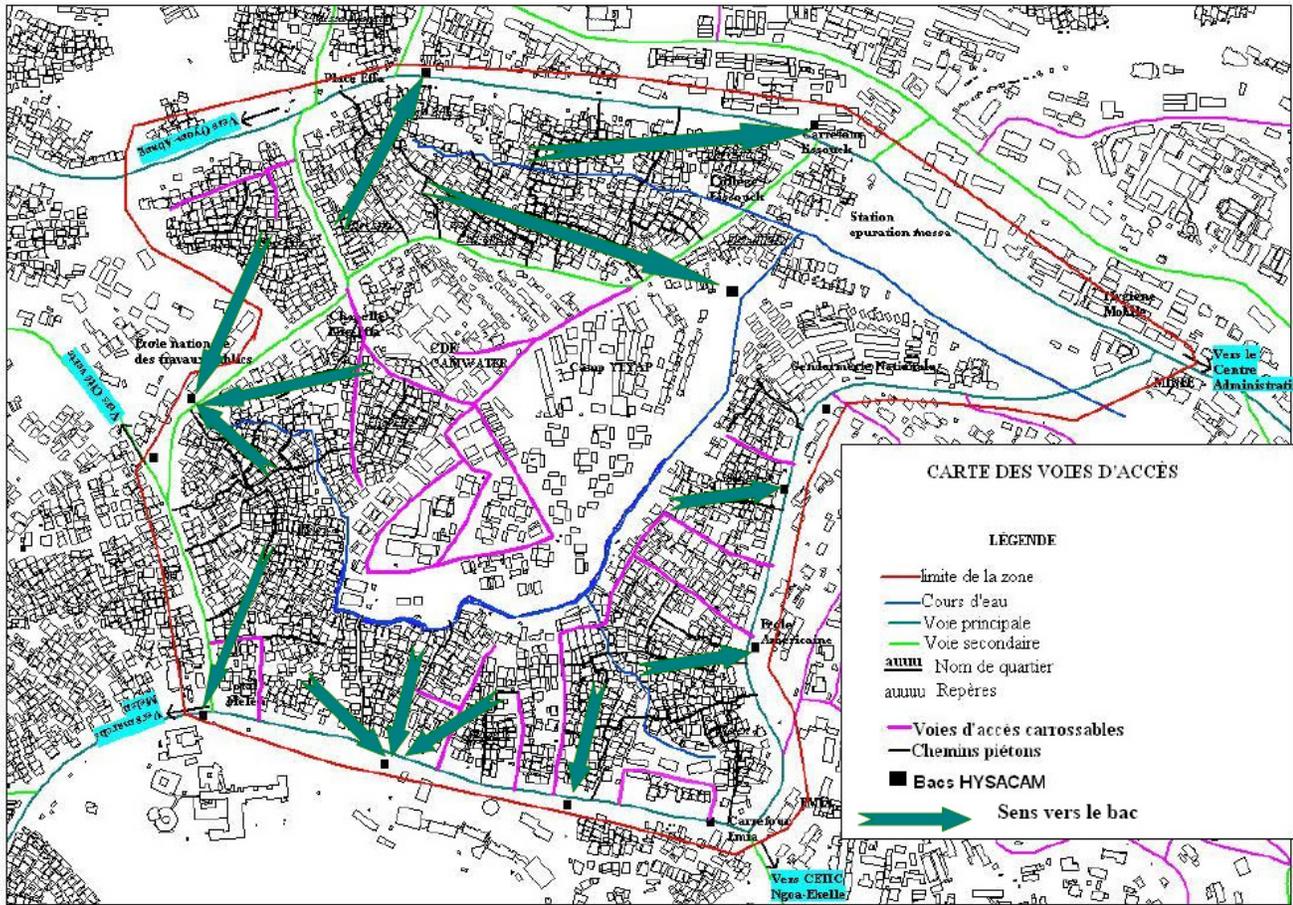


Figure n°2 : Evolution of the agreement to pay of the households before and after the launching of the pre-collection activities on the field.

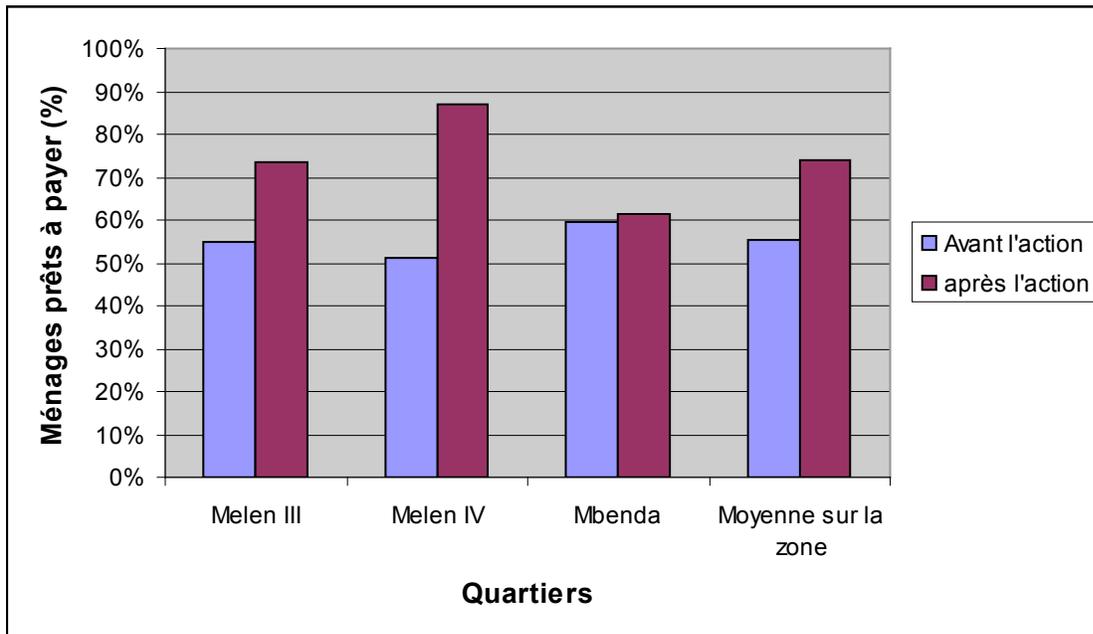


Figure n°3: Proposal of the amount to pay by the households before and after the implementation of the action

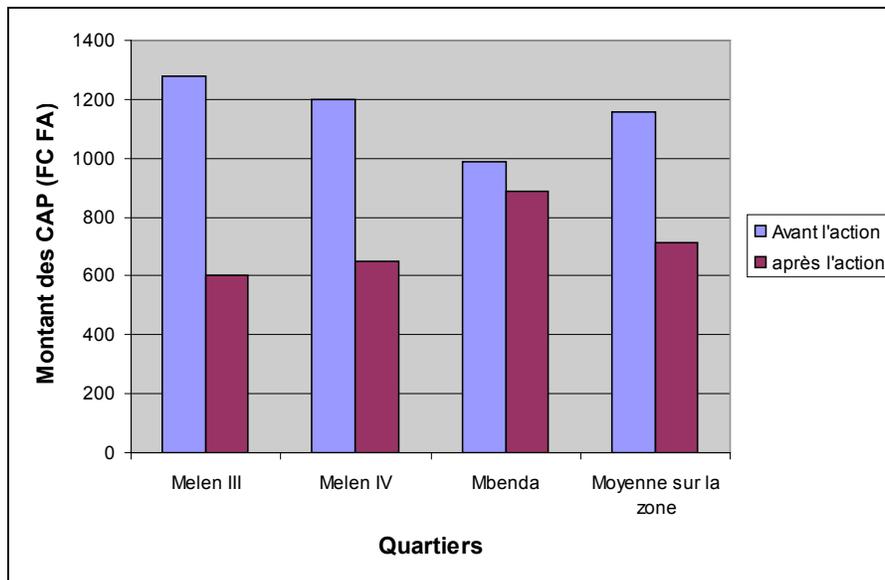


Figure n°4 : Balance sheet of the pre-collection operation during the first year

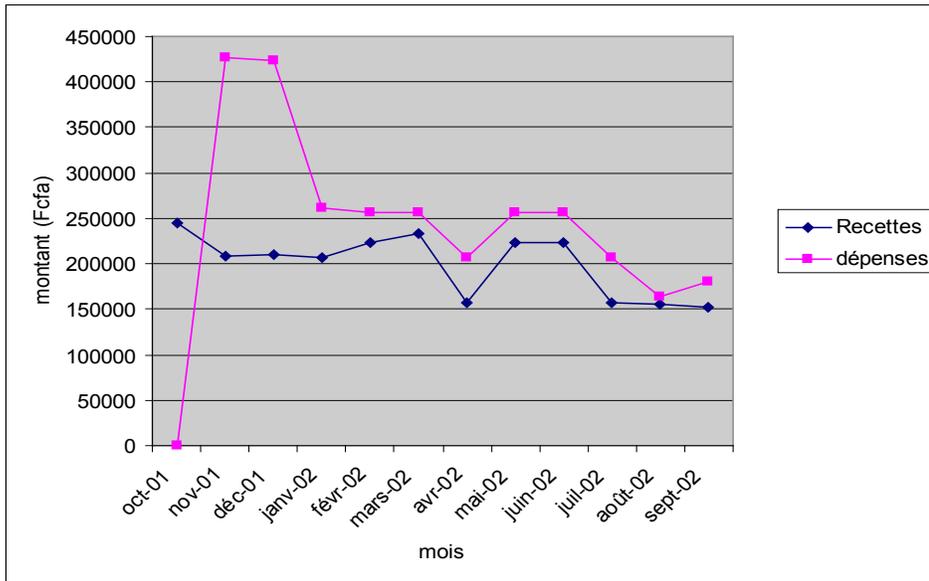


Figure n°5 : Exploitation balance between 2004 and 2005 (5 after the beginning of the operation).

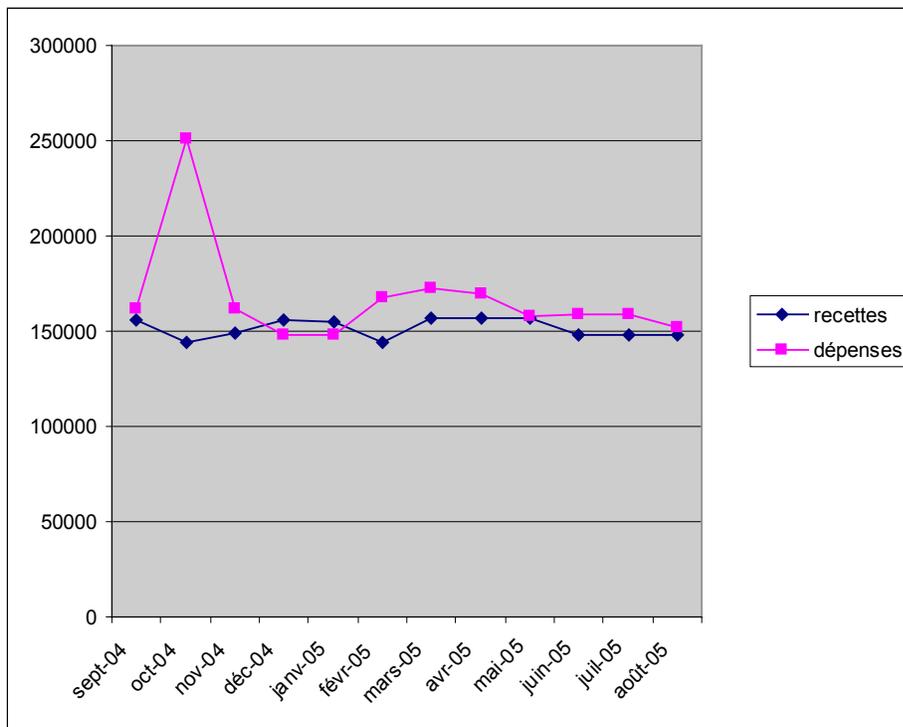
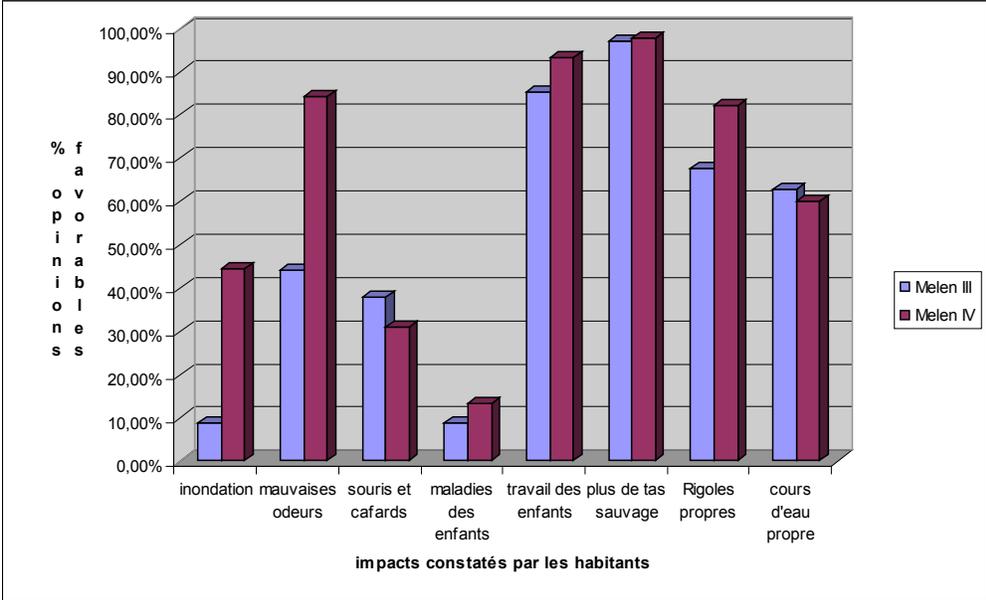


Figure n°6 : environmental and sanitation impacts of the project.



Project #103154: Sustainable Community Based Interventions for Improving Environment and Health in the Banda Slums, Kampala (Uganda)

Contamination Status of Water Sources in Banda Slums, Kampala City

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Abstract:

Introduction

Slums are urban enclaves, conspicuous for environmental decay, giving rise to unprecedented health risks to communities as evidenced by the epidemics of cholera and high incidences of diarrhoea diseases. Deliberate efforts must thus be made to improve the prevailing poor environment and health in slums by seeking solutions within the affected communities. As an initial step towards this, a situation analysis was made of the water source management practices that result into the current environment.

Materials and Methods

A contamination risk assessment survey using observation checklists was conducted for communal stand pipes, protected springs as well as rainwater collection equipment. Tap and spring water was tested *E. Coli* and total coliform bacteria.

Result

A total of 42 functional communal stand pipes were surveyed. Of these, 31% were leaking, 43% had a collection of small pools of water, 91% lacked a drainage canals and 29% had presence of human and animal excreta within 10 metres of the stand pipes. At 48% of the locations, plastic pipes were fitted on the mouth of the tap to direct water into containers whilst 23.8% were located within 30m of a sewer. Overall, 17 % of the stand pipes were reported to have had discontinuity of water in the previous 10 days. Majority of tap water samples had 0/100mls *E. coli*. All spring water sources were found to have flooding the collection area, 86% lacking a protective fence and 43% lacking the protective concrete wall. The spring water varied in quality from 0 – 30 *E. coli* /100mls.

Only three homesteads in the study area harvested rainwater. All the water harvesting equipment was defective, increasing the risk of contamination.

Conclusion

All water sources assessed within the Banda slums were within the low moderate to high risk category thus predisposing community members to diarrhoeal diseases.

Keywords: Slum; Water; Diarrhoea; Contamination; Source

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1. Introduction

One billion people worldwide live in slums and will likely grow to 2 billion by 2030 (UNDP, 2003; UN-HABITAT, 2007a; Beth, 2009). Slums are urban enclaves, conspicuous for environmental decay, giving rise to unprecedented health risks to communities. Clear manifestations of the fast declining health status triggered by the degradation in the ecosystem in slums in Uganda, and especially in Kampala, are evidenced by the epidemics of cholera and typhoid, and a high incidence of diarrhoeal diseases with a case fatality rate of 2.5% and causing 19% of infant deaths (Alajo et al., 2006). Deliberate efforts must thus be made to improve the prevailing poor environment and health in slums by seeking solutions within the affected communities.

Communities in the slums of Banda have had episodes of epidemics of cholera and a high incidence of malaria, pneumonia, dysentery, diarrhoea especially in children, and alarming levels of infant mortality (K.C.C, 2002). Banda parish has a population of 11,899 (UBOS, 2002).

The disease burden in the study area could be attributed to the many features, which are associated with slum areas globally. These features include poor drainage, housing, water sources, personal hygiene, solid waste management and excreta disposal facilities (UN-HABITAT, 2007b).

The purpose of this baseline study was to assess the contamination status of water sources utilized by the community, so as to establish any contributory factors to the prevalence of diarrhoeal diseases within the community of Banda and consequently come up with strategies for improving on the health living of the community.

2. Materials and Methods

2.1 Study area

The study was conducted in the slums of Banda parish. Banda parish is one of the 22 parishes of the Division of Nakawa, which is one of the five Divisions of the City of Kampala. Banda parish is located three kilometres in the eastern side of the city. The study area is characterized by informal settlements with inadequate services and infrastructure. Banda is divided into eleven zones, and this study concentrated on three zones, B1, B3 and B5.

2.2 Water source selection

All water sources being utilized by the community were included in the study. They included stand pipes, springs both protected and unprotected and rainwater harvesting facilities. At each water source, observations were conducted to assess the hygienic conditions, and a sanitary inspection form was filled and each was assigned a risk score.

In addition, water samples were collected for bacteriological analysis, and for tap water chlorine and pH measurements were conducted.

3. Results and Discussion

3.1 Communal Stand pipes

Of the 449 households that were involved in the baseline survey, 67% relied on piped water, which was collected from a communal tap (Figure 1). Water supply to this area is by National Water and Sewerage Corporation, which is the sole supplier of piped water to many urban centres in the country. Of the 50 stand pipes that were selected, only 42 were found to be functional, others having been disconnected due to nonpayment of water bills

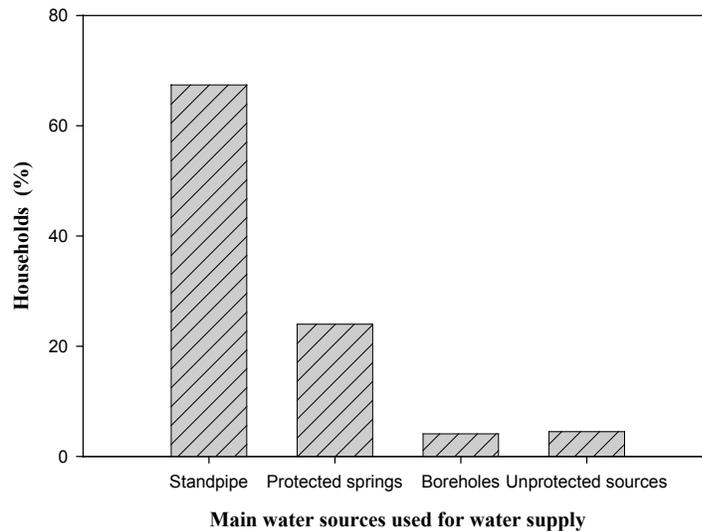


Figure. 1. Water sources utilized in Zones B1, B3 and B5, Banda parish

Table 1. Risk assessment for communal stand pipes

Risk for contamination	Frequency (n= 42 taps)	% at risk
Tap leaking	13	31.0
Surface water collecting around the stand pipe	18	42.9
No drainage canal leading waste water from the stand pipe	38	90.5
Area around the stand pipe eroded	19	45.2
Presence of human and/or animal excreta on the ground within 10m of the stand pipe	12	28.6
Plastic tubing fitted on the mouth of the tap	20	47.6
Pipe leading to the stand pipe exposed	2	4.8
Main water pipe exposed at some points within the zones	5	11.9
Presence of sewer within 30m of the stand pipe	10	23.8
Discontinuity of water in the previous 10 days at the tap	7	16.7
Signs/reports of leaks in the mains pipes within the zone	4	9.5
Water user committees in the area inactive	7	16.7

Almost 91% had spilt water stagnating around the base of the stand pipe, a situation that increases the risk of contaminated water gaining entrance into the piped system. At 48% of stand pipes, plastic tubing to aid in directing water into the narrow openings of jerrycans had been attached to the taps. Although this could be an innovation to reduce water wastage, the hygienic status of some of these tubes was poor, with some stretching to the ground and smeared with dirt.

Tap leakages were not something considered a significant avenue for loss of water, and consequently it was not being reported to the water supplier. Apart from being a contributor to water loss, leakages can be points of entry into the piped water system.

From 42 stand pipes, majority of water samples collected had 0/100mls *E. coli*, with majority having a chlorine residual of above 0.2 mg/L, and a pH of less than 7. At water points where piped water was collected in tanks for vending purposes, the chlorine residual was 0.1 mg/L, a situation that increases risk for contamination due to reduced power for residual disinfection.

3.2 Springs

Spring water is generally pure and may only be contaminated at the spot where it emerges if there is constant human or animal contact. Of the eight springs assessed, only two were of bacteriologically no risk for consumption. The six that showed presence of *E. coli* had most of the features that translate into a spring being protected absent or in various degrees of disrepair. At all springs, the drainage channels for waste water were either blocked by rubbish, silted up or by presence of excessive plant growth. This led to flooding of the collection area. Such a situation may lead to contamination of the collected water especially if dirty flood water gains entrance into the container during the water collection process.

At 86% of the springs, access by both human and animals to the area uphill of the spring was noticeable. In 57% of the springs, the backfill area behind the retaining wall was eroded, a situation that increases risk of contaminating the water while in the spring box. At 71% of the

springs, there were pit latrines within 30m, and there either no diversion ditches above the spring or blocked and non-functional. These features all predispose the water being collected to contamination.

The water samples collected from eight springs varied in quality from low to high risk, with counts of 0 – 30/100mls *E. coli* respectively as seen in table 2.

Table 2. Bacteriological quality of spring water sources in terms of *E. coli*

Name of water source	Zone	Counts/100 ml
Lower Meeting Point Reservoir Protected spring	B1	8
Bugolobi Protected spring	B1	10
Nalongo Unprotected spring	B3	3
Nabuze Protected spring	B3	2
Nakalo Protected spring	B3	0
Kukazi Unprotected spring	B3	30
Kaseyi Protected spring	B3	7
Namukasa Asiya Protected spring	B3	0

3.3 Rain water harvesting facilities

Only three homesteads in the study area harvested rainwater. All the water harvesting equipment was defective, increasing the risk of contamination.

4. Conclusion and recommendation

All water sources assessed within the Banda slums were within the low moderate to high risk category thus predisposing community members to diarrhoeal diseases. There is therefore urgent need to institute measures to ensure community members access safe water.

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Community perceptions of causes and solutions to poor environmental sanitation in Banda Slums, Kampala City

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Abstract

Aims

Evidence shows urban slums have become breeding grounds for environmental diseases like diarrhea and cholera as well as poor child nutrition contributing to high infant mortality rates. Despite urban authorities lacking resources to provide required services, they continue to leave beneficiary communities as ‘passive’ service consumers. To improve the environment and health status, affected communities should be involved in problem identification and complementing urban authority efforts. Community perceptions of the causes and remedies for the poor environmental situation in Banda slum were hence explored.

Methods

Six Focus Group Discussions and fifteen Key Informant interviews were conducted amongst community members and local leaders.

Results

Unsafe water, poor drainage and garbage disposal, inadequate latrines and air pollution were key environmental problems facing the community and perceived to have worsened over the last five years. As a result, flies, congested walkways, cholera outbreaks, rampant diarrhoea, respiratory problems, malaria and death were common.

Perceived causal factors were community neglect by local leaders/government evidenced by failure to secure garbage disposal facilities, implement cleaning efforts and hold regular environmental sensitization meetings. Lack of environmental protection bi-laws and deterrent action against poor waste disposal and misuse of drainage systems was noted. Other causes were unplanned/wetland settlements and clogged culverts stemming from the irresponsibility or ignorance of community members.

Community members expressed willingness to work with the local leaders to alleviate the situation. Local leaders however needed to prioritize environmental cleanliness by securing garbage disposal containers and cleaning equipment, regularly sensitizing residents about good sanitation and enact environmental cleanliness bi-laws. Government was urged to adopt of a preventive rather than epidemic treatment approach.

Conclusions

Communities are willing to be solution to their environmental problems, complemented by local leaders fulfilling their social responsibility by providing physical support and an enabling legal framework.

Keywords: Community; Perception; Environment; Sanitation; Kampala

1 Introduction

Evidence shows urban slums have become breeding grounds for environmental diseases like diarrhea and cholera as well as poor child nutrition contributing to high infant mortality rates (UN Habitat 2003 & 2006). Despite urban authorities lacking resources to provide required services, they continue to leave beneficiary communities as ‘passive’ service consumers. To improve the environment and health status, affected communities should be involved in problem identification and complementing urban authority efforts. Community perceptions of the causes and remedies for the poor environmental situation in Banda slum were hence explored.

2 Methods

In February 2009, two focus group discussions (one male and one female) were conducted in each of the three study zones in Banda to explore environmental issues affecting the community and strategies to address them. A total of 15 key informants (8 males and 7 females) were also interviewed.

3 Findings

3.1 Main environmental problems affecting Banda slums

The main environmental problems identified by the affected community basically hinged on the poor garbage, drainage and other waste disposal, unsafe water as well as air pollution.

Poor garbage disposal

Being a slum area, Banda is largely characterized by the growing presence unplanned settlements due to the regularly increasing population in the area. The garbage generated by the resident population is a point of concern. Focus group discussants expressed that the garbage has become an environmental hazard and a nuisance as it is littered all over due to lack of garbage disposal facilities.

There is no garbage container and thus garbage is dumped anywhere including on people’s neighbours’ verandas (Female FGD Zone B5).

It was noted that it was only when one feels concerned that he or she takes the garbage to a considerably acceptable disposal point.

Poor drainage

All the focus group discussants as well as key informants identified poor drainage as the leading environmental problem in the community. It was revealed that the problem escalated when some people turn the narrow culverts available for drainage into a dumping ground for garbage. The poor drainage of the area is further exacerbated by the fact that during the rainy season all the water from uphill areas flows to the low lying wetland area creating fertile ground for flooding. According to key informants, the flood water ends up in people's homes and/or causes diseases such as malaria and diarrhoea.

Because of poor drainage, it does not facilitate flow of water because garbage is dumped in the system breeding mosquitoes leading to rampant malaria as an epidemic (KI Zone B3)

When it rains, the whole place floods and the conditions become intolerable sometimes leading to water borne diseases such as diarrhea. The area is only secure during the shiny season. (KI Zone B3)

Lack of adequate latrines

Given the limited land space and absence of any recommended building plans there is insufficient space for the construction of latrines both private or public latrines. A charge is associated with the use of public latrines which the residents due to their socio-economic status find unaffordable and people don't have adequate latrine facilities. Even public toilets are not enough. Because of this, people have resorted to "flying" toilets (Male FGD Zone B1)

Some residents resort to use of polythene bags which are then thrown in the drainage channels or and on roofs of neighbours. (Male FGD Zone B3)

In the whole community, there is only one established latrine facility whose utilization costs 100 Uganda shilling (0.05\$*) (KI Zone B3)

Due to the unhygienic methods of faecal waste disposal it was revealed that cholera outbreaks as well as deaths are not uncommon phenomena

Unsafe water

When it rains, some of the community members harvest rain water from their roof tops. Many use it for domestic purposes especially drinking as they consider it safer and cheaper than tap or spring water. The result of lack direct usage of the rain water was revealed to result in illness and this inevitably exposes the community members and children especially to sickness (KI Zone B)

Air pollution

One of the socio-economic activities conducted in the area is stone quarrying. Local methods such as burning of car tyres were reported to be used to weaken the rock. Emanating fumes from the burning tires bears effect on the lives of those working in the quarries as well as the population around.

In the process of quarrying, car tires are burnt to soften the stone/rocks. These produce a lot of fumes yet people are settled just adjacent the rock. (Male FGD Zone B1)

3.2. Manifestations of environmental problems in the Banda

Overall, as a result of these environmental problems, flies, congested walkways, cholera outbreaks, rampant diarrhoea, respiratory problems, malaria and death were common. Many flies are present in 'Toninyila' (unclean) market which jump from item to item i.e. from fish to jackfruit to fried cassava and so on (KI Zone B5)

Some people around the quarry site do suffocate because of the effect of smoke from the burnt tires. (Male FGD Zone B)

Polythene bags used as flying toilets are seen at the rubbish points and in the drainage channels. Some are kicked by by-passers and even the rampant diarrhea in children is common as a result of children playing with polythene bags containing human wastes. (Female FGD Zone B1)

Flooding associated with cholera which comes as a result of blocking the drainage with garbage, persistent malaria which arises from stagnant water in the drainage system whose flow is blocked by garbage, diarrhea caused by use of flying toilets (polythene with faeces thrown) into the drainage stream and on roofs as well as lack of latrine facilities by many households (KI Zone B3)

3.3. Perception of the trend of the key environmental problems

The majority of community perceived the environmental situation to have worsened in the past five years. Key indicators used to substantiate this perception were congestion within the area, indiscriminate garbage and fecal disposal as well as settlement of new residents in quarry areas. Some typical quotes given were:

“..... as the number of people increase, congestion becomes more manifest and the amount of garbage increases. This also makes some people to find selfish ways of copying, there by disposing the garbage into the drainage. (Female FGD Zone B5)

“.....When you go downhill you find faeces closely scattered like someone is drying 'Malwa' – local brew”. The case was not as this 3 – 5 years ago. (Female FGD Zone B1)

However some community members were more optimistic and saw promising positive changes over the 5 years. It was revealed that over this period, the area has witnessed construction of drainage system with support from organizations like AVIS. It was also mentioned that the area had registered some members that have built houses accompanied by toilets which was not the case before.

4. Causes of poor environmental problems

Community members cited mainly system and individual factors as accountable for the environmental problems in the area.

4.1 System causal factors

Key amongst the system factors mentioned was neglect by local leaders/government. As an example, the slow reaction/response time by the authorities as illustrated in the following quote:

The community faces difficulties from Kampala City Council (KCC) because of its reluctance. When KCC is informed of the situation of at hand, it takes time to react and takes even more time to respond when it does (Key Informant Zone B3)

Community members elaborated that they feel neglected because, leaders had failed to facilitate reclamation of the drainage system and implement formal cleaning efforts through securing garbage disposal facilities as well as the provision of cleaning equipment like hoes, racks, spades, gum boots, gloves among others. They also lamented about the lack of regular sensitization meetings to enhance environmental sanitation.

In addition, it was noted that although the population in the area was rapidly growing there were no environmental protection by-laws and deterrent action against poor waste disposal, misuse of drainage systems or to facilitate maintenance of a safe and clean environment.

4.2 Individual causal factors

Unplanned and wetland settlements as well as clogged culverts stemming from the irresponsibility or ignorance of community members were amongst the individual causal factors noted. Poverty as well as insecurity in Northern Uganda was identified as factors that led people to live in such hygienic conditions. In regards to the socio-economic conditions, focus group discussion members stressed that

With money, one cannot afford not to live such unhygienic environment characterized by congestion, poor sanitation, poor drainage, inadequate toilet/latrine facilities (Male FGD Zone B1)

Some of the problems like pollution from fumes of burnt car tyres are linked to the economic activity of stone quarrying. As long as the activity goes on, pollution is expected (KI Zone BI)

5. Recommendations to improve the environmental sanitation situation

Community members expressed willingness to work with the local leaders to alleviate the situation as they perceived themselves as equally duty bound in contributing towards the development of their own community. To enable this, they appealed to elected leaders to support them with garbage disposal containers as well as equipment to clean and reclaim the drainage system.

Kampala City Council should support this zone with a container to ensure easy management and disposal of garbage. But in the meantime, rubbish pits should be encouraged (KI Zone B1)

It was also emphasized that there was need to mobilize and regularly sensitize people about good sanitation so as to modify their attitudes

The LCs also needs to strengthen /harden on the need for the general cleanliness through sensitization and enforcement (KI Zone B1)

Community based organizations and KCC should help to sensitize the population of the community the dangers of associating with the poor environment, this will reduce on the people to block the drainage systems, avoiding throwing polythene with wastes (Male FGD Zone B3)

Furthermore, an emphatic call was made for the enactment of environmental cleanliness bi-laws.

There should be enactment of bi-laws to protect the environment and sanitation in particular. There should be a fine attached to failure to comply. This will instil respect for the environment (KI Zone B1)

In as much as bad experiences such as of cholera were noted to drive those affected to good environmental practices like boiling drinking water and construction of houses backed by latrines, this was said to be temporarily and largely driven by government efforts. Government was urged to adopt of a preventive rather than epidemic treatment approach. In elaboration of this, it was mentioned that

When diseases like cholera break out government proves serious, brings a health team to manage the epidemic but when the disease goes the team also disappear. This impliedly means that the non-acute environmental problems are not given priority (KI Zone B5)

6. Conclusion and recommendations

Unsafe water, poor drainage and garbage disposal, inadequate latrines and air pollution were key environmental problems facing the community and perceived to have worsened over the last five years. As a result, flies, congested walkways, cholera outbreaks, rampant diarrhoea, respiratory problems, malaria and death were common.

Community members cited mainly system and individual factors as accountable for the environmental problems in the area. Communities are willing to be solution to their environmental problems, complemented by local leaders fulfilling their social responsibility by providing physical support and an enabling legal framework.

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Prevalence, causes of diarrhea among children aged 6-36 months and latrine coverage in Banda Slum, Kampala, Uganda

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Abstract

Background

Slums have a high burden of environmental challenges triggered by the degradation of the ecosystem. These expose slum residents to several health risks which include diarrhea diseases.

Methods

Four hundred forty nine households with at least one child aged 6-36 months were consecutively enrolled. Households were drawn from three zones of Banda with unique ecological and geographic patterns. The prevalence of diarrhea, its causal organisms by microscopy and culture and the pit latrine coverage were determined as proxy indicators for a poor environment in the Banda slums.

Results

Ninety one (20.3%) of the households had a child with diarrhea at the time of interview. Muslims were significantly less likely (OR=0.45, 95% CI 0.21-0.97) to have diarrhea compared to other religions. The children from northern (OR=2.06, 95% CI 1.07, 4.019) and out of Uganda (OR=4.74, 1.27, 17.77) were at a higher risk of diarrhea disease than those from Central region. There was no difference in the distribution of diarrhea cases by zone. The stool microscopy results revealed yeasts 1.1% and pus cells 2.2%. Stool culture identified the following organisms; Candida spp 1.1%, E. Coli 2.2%, Shigella spp 1.1%, Aeromonas spp 1.1% , for modified ZN results, Cyclospora oocysts 5% , and Cryptosporidium oocysts 8.2%. One hundred sixty two (36.4%) households had non-shared latrine, 234(52.6 %) were using a community latrine and 3 respondents reported throwing their faeces in the bush or yard.

Conclusions

Although prevalence of diarrhea in Banda is high, only 17.6% had identifiable microorganism causes. The low household latrine coverage and poor fecal disposal practices puts slum populations at high risk of epidemic outbreaks like cholera and dysentery. There is urgent need to advocate for proper waste disposal among populations in Banda slums.

Keywords: Prevalence; Diarrhoea; Latrine; Cause; Risk

1. Introduction

Slums are characterized by absolute poverty, inadequate infrastructure as evidenced by weak building materials; lack of public health services such as water, sanitation and drainage [Elliot et

al, 2006]. Poor hygiene practices characterized by poor waste disposal which get to its worst during the wet seasons put the slum dwellers at high health risks [SAP-Uganda 2009].

In Uganda over 75% of disease burden is due to poor personal and domestic hygiene and inadequate sanitation practices (failure to break the faecal-oral disease transmission routes) [HSSP II]. Because of this the Ministry of Health (MOH) Uganda set strategies to improve the environmental health and safe waste disposal through improvement of latrine coverage from 57% to 70% by 2010; The MOH, Uganda also set to increase the proportion of patients with epidemic diarrhea that receive appropriate treatment within 12 hours of onset of symptoms [HSSPII]. In Kampala, the city authorities have made efforts to control diarrhea epidemics through health education, safe water and increased disease surveillance. Despite these efforts there have been cholera outbreaks as recent as 2006 [Enrlich: 2006].

Data on incidence of diarrhea and latrine coverage for Uganda and Kampala City exists, but specific data of the causal organisms, risk factors for diarrhea and latrine coverage in Uganda slums was lacking. This posed challenges in development of strategies to control diarrhea; to generate this data, we selected Banda slum to represent other slums within Kampala city and other Uganda towns. Children less than 5 years were selected because their vulnerability to diarrhea diseases. We determined the prevalence of, risk factors and the causal organisms for the diarrhea by microscopy and culture and latrine coverage in Banda as proxy indicators for a poor environment in slums of Uganda. The findings of this research will be used in designing specific interventions that will help contribute to the improvement of sanitation and reduction of diarrhea among the slum dwellers.

2. Methods

In February 2009, using a cross sectional study design we consecutively enrolled and interviewed 449 household heads or respondents who had at least one child aged 6-36 months in their household within the three zones (B1=58% , B3=33% & B5=9%) of Banda parish. The numbers of households interviewed from each zone were determined by proportionate sampling. Households were drawn from three zones of Banda with unique ecological and geographic patterns. B1 was the most congested zone but located at a hill, B3 is a wetland characterized by frequent floods while B5 was an uphill location with less congestion. We assessed if the diarrhea disease patterns among children aged 6-36 months differed in each of the above mentioned zones. We also asked respondents if any of their children aged 6-36 months had diarrhea at the time of interview and those with diarrhea had their stool collected under sterile conditions; transported to the Makerere School of Public health microbiology laboratory where microscopy examination and culture of stool was done to isolate the causal organisms. We also assessed the latrine coverage and asked for the latrine type and if it was shared by other households.

3. Results

3.1 Prevalence, Risk factors and causal organisms for diarrhea in Banda slum

Ninety one (20.3%) of the households had at least one child with a new diarrhea case at the time of interview. Muslims were significantly less likely (OR=0.45, 95% CI 0.21-0.97) to have diarrhea compared to the catholic faith. Households where water containers were cleaned twice were less likely (OR=0.42 95%CI 0.22, 0.80) to have diarrhea compared to those who cleaned

daily, Households where their main employment contributed more than 75% were less likely (OR= 0.46, 95%CI 0.21, 0.99) to have diarrhea compared to those who got less than 25% of their income from their main employment. Those whose origin was northern Uganda (OR=2.06, 95% CI 1.07, 4.019) and out of Uganda (OR= 4.74, 1.27, 17.77) were at a higher risk of getting diarrhea compared to those from Central Uganda. Children in households with single men parents as decision makers and providers were (OR= 13.25, 95%CI 1.31, 133.85) at a higher risk compared to those where husbands were the main provider but with a wife as a companion at home. There was no difference in the distribution of diarrhea cases by zone (B1 OR=1.24 95%CI 0.54, 2.84) and Zone B3 OR=0.60 95%CI 0.24, 1.49) as compared to the zone B5.

Other risk factors that were assessed but found not to be significantly associated with diarrhea were sex of household head, Protected or non-protected water source, Education level of household head, marital status, duration of stay in Banda, House hold ownership, distance from the water source, quantity of water used, method of water purification and type of water storage container.

3.2 Microscopy and results for culture of stool collected from children with diarrhea

The stool microscopy results (Figure 1) revealed yeasts 1.1% (1/91) and pus cells 2.2% (2/91) while stool culture results, the identified the following organisms; *Candida spp* 1.1% (1/91), *E. Coli* 2.2% (2/91), *Shigella spp* 1.1% (1/91), *Aeromonas spp* 1.1% (1/91), for modified ZN results, *Cyclospora oocysts* 5% (4/85), and *Cryptosporidium oocysts* 8.2% (7/85).

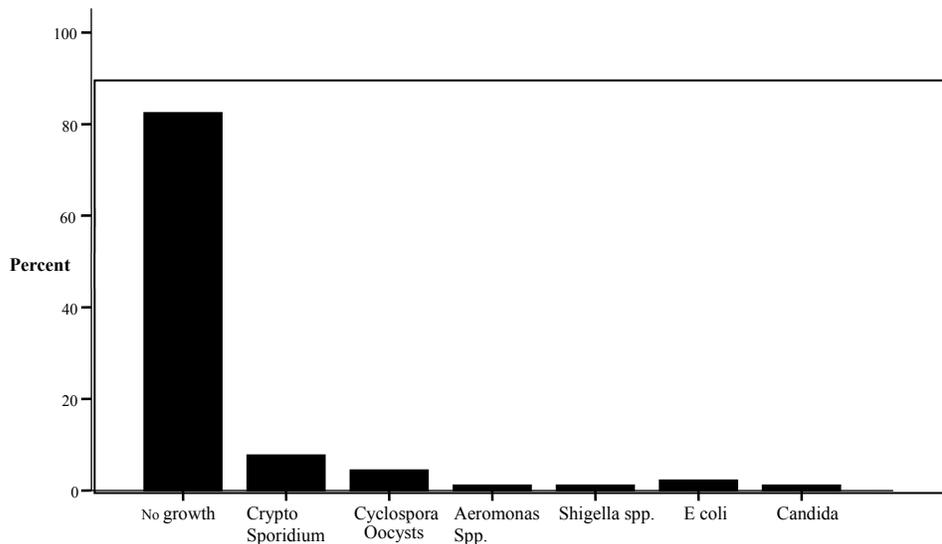


Figure 1. Stool culture results for 91 children found with diarrhea

3.3 Pit latrine coverage and use among Banda slum residents

One hundred sixty two (36.4%) of the 445 households had a latrine which was not shared by another household; 90.6% (145/160) of these were ordinary pit latrines, 9.4% (15/160) VIPs and none had a toilet. One hundred fifty four (65 %) of the 237 without private latrines were using a community/neighbors latrine and 3 respondents reported throwing their faeces in the bush or yard (Figure 2). Sixty two (27.2%) had a pit latrine shared by 1-5 persons while 52(22.8%) of households had a pit latrine shared by >30 persons (Figure 3).

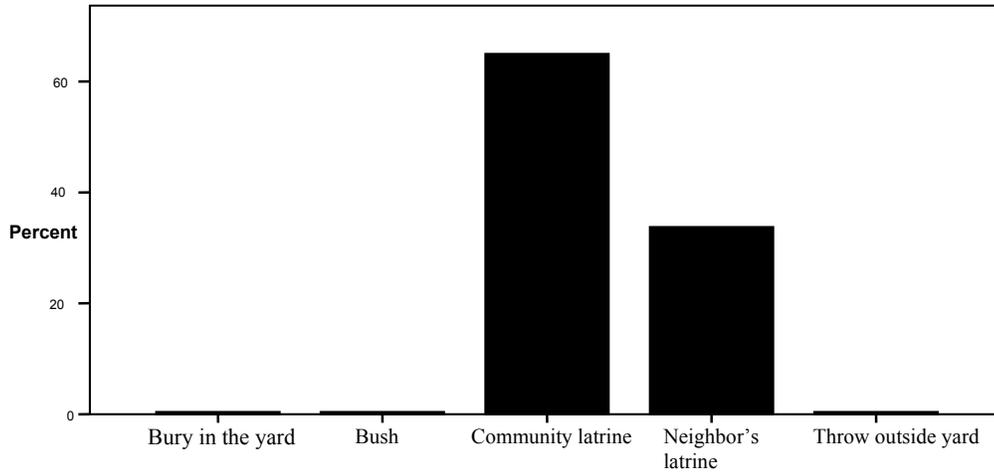


Figure 2. Fecal disposal methods for households sharing latrines

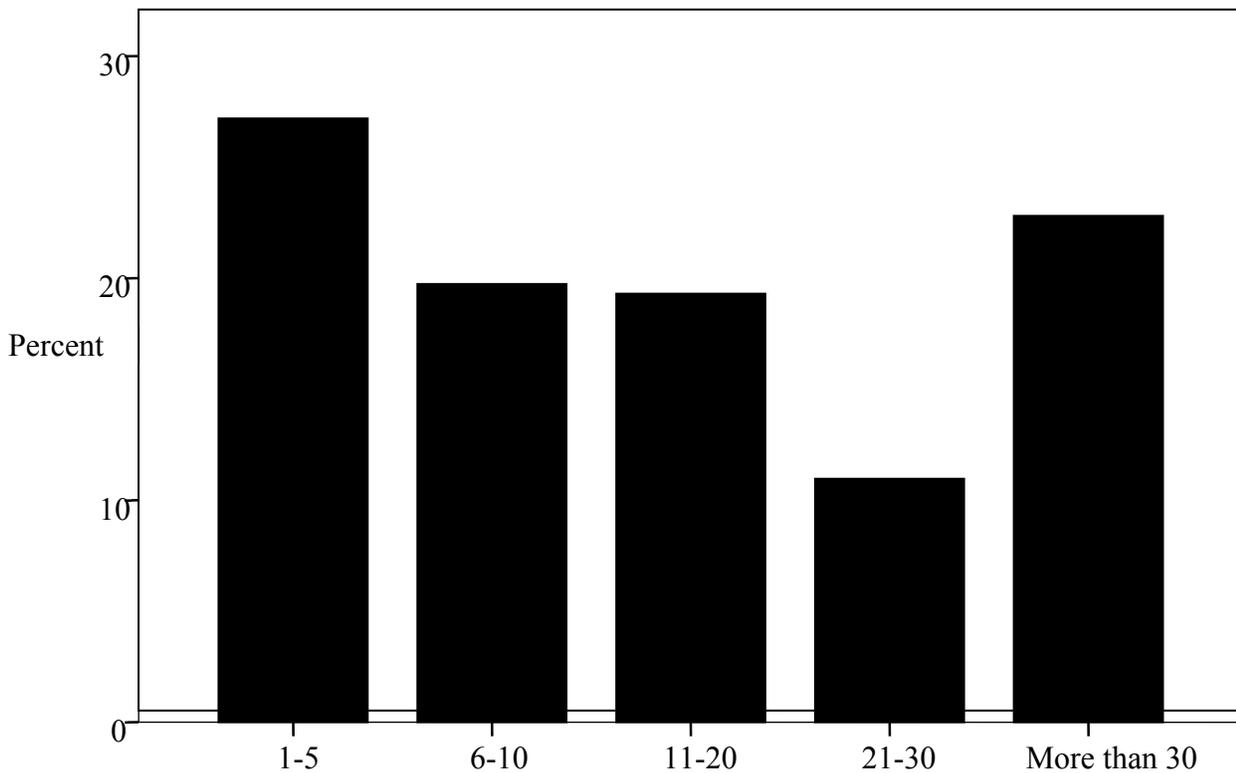


Figure 3. Number of households that share a latrine

4. Conclusions and recommendations

There is a high prevalence of diarrhea with only 17.6 % (16/91) having identifiable microorganism causes. The low latrine coverage, the poor latrine structures that are shared by many households and poor fecal disposal practices by some Banda slum dwellers put this population at a high risk of epidemic outbreaks like cholera and Dysentery. There is urgent need to develop strategies to improve the environment and to address proper waste disposal through construction of standard VIP latrines or toilets for use in Banda slums.

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Project #104262 : Ecohealth in Focus Cities - Lima, Peru

Examining the ecosystemic relationships between recycling of solid waste and Urban Health in Left Bank of Rímac River, Lima-Peru.

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Abstract.

Objective

To examine the influence working conditions, work practices, living conditions, environmental conditions, social and structural determinants on the health of workers and their families as related to solid waste practices on the left bank of the River Rímac in Lima. The work identifies multiple hazardous processes related to psychosocial, ergonomic, biological, physical, and toxicological aspects, which can lead to harmful effects of urban health, linked to the human ecosystem.

Methodology

We use a combined methodology with the characterization of risks at four levels of determination: recycling sites, workers, families; to investigate the estimated exposure to these risk factors. We will begin with the identification of patterns of multiple exposures both outside and inside their homes, and recycling sites, then perform the characterization of these exposures, and then assess their significance and finally develop estimates of exposure with the help of observational and analytical techniques.

Results

Preliminary results of this characterization in a qualitative and participatory techniques with the workers and their families in their areas of work, led to the identification of the production process, occupational hazardous, exposures, in the context of policy.

Conclusions

It is expected that this first approach allows us to establish a research methodology and explore links research results with policy Ecohealth approach. This could include an integrated analysis of the various factors that influence the social dynamics in order to further develop plans and programs to recycle solid waste in Lima.

Keywords: Keywords: recycler, human ecosystem, health.

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1. Introduction

In the last decade attention has increased among the community of researchers and activists, on the promotion of health considering the relationships among people and their ecosystems (CPHA, 1994, Brown, 1994). The "ecological" approach to health promotion involves the environment as a relevant component of human development (Kickbush, 1989; Hancock, 1993).

At the same time, environmental scientists have considered the issue of ecosystem health (Rapport, 1989) and environmental management practices to include human health as part of ecosystemic health (IJC, 1991). An ecosystem can be defined as "a set of interacting species and their non-biological environment, functioning together to sustain life" (Moll and Petit, 1994). In the case of urban environment is possible to define a city as a unique ecosystem, and also consider the city as consisting of several individual ecosystems (Rebele, 1994).

The interactions between humans and ecosystems have been interpreted in three proposed frames by some authors: as a source of negative factors; as a basis for development, or as a system of mobilizer values (Cole, 1999). In terms of pollution by the presence and management of different pollutants, appears the methodological difficulty of characterization of exposure, as well as modeling of health determinants.

One important set of human interactions with ecosystems, is constituted by the work activity, health services and interventions in the environment (Cole et al, 2006). The work creates impacts on the biota and the physical environment, including housing and use of human space. Thus working activities are an important determinant of health (Lalonde, 1974; Evans, 1994; Patz, 2004).

Changes in working conditions however, aid to improve indicators of positive interactions with the environment. In other experiences described, these changes could be interpreted as protective, and decrease the risk of ecosystem relations. (Spiegel, 2006)

In Peru, especially in Lima its capital, there were political, economic and social changes during the last 50 years, maintaining a highly centralized model of development. Lima has the Rimac River as the most important natural resource for 8 million of population. We choose the Left Bank of the Rímac River (MIRR) because people live in a conjoint of strong relationships with environment, working in urban scenario.

In terms of population growth, the MIRR is one of the most densely populated areas of Lima. However, it does not have proper urban services such as water sanitation, waste disposal, police surveillance, schools, municipal administration, resulting in slumming and impoverishment of the quality of life of its population. The indicators of human welfare are among the lowest in the country with a high proportion of employment in informal work. The pickup, storage and sale of solid waste is an important economic activity in MIRR, involving the use of housing and areas around the home (peri-domestic) of recyclers with the consequent reduction in the use of garden areas for housing, lower recreation areas for children. Other hazards include fire from the storage of combustible materials (paper, cardboard), the presence of vectors of communicable diseases and establishment of new ecosystems that endangering human health.

This work aims to examine relations between ecosystems and solid waste management, considering human and environmental safety in a neighborhood on the Left Bank of the Rímac River.

2. Objective

To estimate the potential benefits of communitarian interventions in the recycle work and reducing the risk level of hazardous processes in the psychosocial aspects, ergonomic, biological, physical, chemical, which can lead to harmful effects of urban health, linked to human ecosystems.

2. Methodology

The study population comprises 454 inhabitants of MIRR, of both sexes and all ages who are residents in the area. A survey was administered to all households of workers recyclers, including data collection from family and people in their homes. To this end, was developed a list of the names of members of three organizations from recyclers in the area.

The survey included questions on demographics, job, health, activities at home and in the immediate environment. We met with workers in focus group meetings to describe the contents of the work activities and social reproduction in relation to the different areas of the MIRR.

For risk characterization data has been gathered through different entry points: solid waste workers, their families, organized labor and population. Hazardous processes have been described to contextualize respective exposures. Interactions among different components of the whole ecosystem are represented on GIS-based maps with information on each level including a survey of the MIRR. Statistical analysis are made for data interpretation.

Ecological and health indicators were investigated in the context of the solid waste activities – collection, transportation, selection and storage in the MIRR. These indicators were compared with indicators of stress on urban ecosystems (Trevor, 2000). These indicators are used to identify patterns of multiple exposures within and outside their homes, and recycling sites. Indicators of exposures will be used for risk characterization.

It measured the types and uses of living surfaces in relation to jobs and housing, and will be estimated capabilities and reserves of changes in the uses of these surfaces, such as use of residential recycling and domestic use for social reproduction of families of recyclers (resting activities, meals and recreation), frequency and intensity of contact with biological, chemical, ergonomic and physical labor agents of recycling.

3. Results

Preliminary results of this characterization of risk in relations of ecosystems and human health, using qualitative and participatory techniques with workers and their families in their areas of work, allowed the identification of the productive processes, hazards, and exposures, considering the political-institutional contingencies.

A total of 202 recyclers aged between 18 to 59 years old were identified in 724 people (27.9%), and 70 (34.6% of 202) were women. In the group of segregators 143 persons (70.9% of 202) used their homes for waste selection.

This initial survey has been used as the basis for the ergonomic, toxicological, anthropological and social-psychological studies of the project to characterize human impact on ecosystems.

Also, it is found that the integration of local knowledge is possible to develop strategies for policy impact, such as proposals for discussion by the Solid Waste Rules and the Law on the work of the recycler, as well as the development of proposals for solutions to the urban health problems and their determinants.

4. Conclusions

It is hoped that this first approach allows us to establish a research methodology proposal and to explore results linkages with policies and research with the Ecohealth approach.

The pathways for political, and social changes has been identified and characterized. This will be used to work with organizations and municipal recyclers.

The approach constructed to characterize ecosystemic relationships between recycle work and human health might include an integrated analysis of the various factors that influence the social and ecological dynamics, in order to further develop plans and programs for solid waste recycling in the MIRR and other areas of similar ecological characteristics in Lima.

We consider in this research, the use of spaces in the area of the MIRR and its relationship with emerging health problems and the need to pay attention to the needs of the community in relation to different urban ecosystems and not just their immediate environments.

The health of the environment is directly related to the health of communities in the MIRR. Complex relationships have arisen that require to be addressed from the perspective of Ecohealth approach.

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Project #104659: Urban Ecosystem Health in Kathmandu (Nepal) - Phase III

Kathmandu Urban Ecosystem Health Project a Model Approach

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Extended abstract paper on 17 August 17, 2009

Abstract

International Development Research Centre (IDRC) supported research study on Echinococcosis/Hydatidosis which was carried out between 1992 and 2001 in Kathmandu Metropolitan City Nepal. The research work was carried out in two distinct project stages in wards 19 and 20 of KMC one from 1992-1996 (applying a traditional epidemiology approach) and a second was Urban Ecosystem Health Project (UEHP) Approach from 1998-2006. Overall, there were three main steps of activities in the development of the UEHP in Nepal: First is an exploratory/analytical systemic steps focusing on linkages between social, ecological, and health variables (1998-2001); The second a community action step employing a variety of systemic, narrative, and participatory-action research tools (2003-2006); and the third phase of urban ecosystem health project started from 2007 to 2009 which is now running. Community participation or participatory action research is a key element of ecosystem health programmes. Participatory Action Research approaches have three main goals. The first step is to describe what is there? What are the physical and socio-economic possibilities of this person or place? If we use the analogy of a person? The Second step, for ecosystems as for individuals, health is not just a physical state, but what we might call a spiritual state. It has been said that in any part of the world no solutions will be sustainable in the long run unless they are rooted in the communities where the problems occur, drawing on the people in these communities and their many skills, resources, and important knowledge, and those communities feel empowered and supported by higher levels of government. If such approaches can be worked out between local communities in Indian Subcontinent, non-government organizations, businesses, regional institutions of government and university, and with outside input only as necessary, then truly sustainable solutions will be found, and Kathmandu.

Keywords: Ecosystem; urban; PAR; Echinococcosis/Hydatidosis

Introduction

Urban health does not mean that human health status in any urban setting of human population, but it means something else also that is health of any living creatures existing in and around of the city or urban or peri-urban or mixture of these all which affects directly or indirectly on human health. That means one has to understand that urban health is something more than human health which could be assessed on the following system of health existing in any organization of the world.

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1. Urban human health system
2. Urban animal health system
3. Urban ecological health system where lots of plants, insects, vectors, wild animals in captive, laboratory/research animals, pet animals, sports animals etc. live in this big system and lastly
4. Urban environmental health system where you have many things to be understood like urban housing pattern, drinking water supply system, sewerage and waste drainage system, roads condition, vehicle/transportation pressure, air pollution, noise/sound pollution, water pollution, industrial pollution, global warming situation and others.

So in all these urban health systems many infectious disease like emerging and re-emerging disease are also existing its matter of when and where you get outbreak which neither medical doctors, veterinary doctors, policy makers, decision makers and implementers know about it. You get this type of disease outbreak only when there is no integrated/collaborative short term, midterm and long term planning of infectious disease prevention and control through the participatory of community people and collaborative participatory approach method of all concern stakeholders involved in one way or other in the urban health set up.

Background Information on Kathmandu Model Approach

Epidemiological Approaches (1992–1996): Beginning in the 1990s, the National Zoonoses and Food Hygiene Research Centre (NZFHRC) and the University of Guelph, with collaboration from researchers at Centers for Disease Control (CDC) in Atlanta and Salford University in England, initiated a series of epidemiological studies to determine rates of disease in animals and people, and identify risk factors which could – in theory – be manipulated to prevent the disease. These risk factors related to canine and human behavior, human – dog interactions in the community, and open – air slaughtering along the banks of the Bishnumati River in Wards 19 and 20 in Kathmandu. At the final workshop for stage one of the project, January 23-24, 1996, the researchers proposed more systemic model, which is termed as an **ecosystem health model**.



Photo 1: Buffalo carcass is being burned with paddy straw traditional method.



Photo 2: Common method of slaughtering in ground on roadside

IDRC supported research study on Echinococcosis/Hydatidosis was carried out between 1992 and 2001 in Kathmandu Metropolitan City Nepal. Initially this was designed to investigate risk factors for the occurrence of cystic Hydatidosis, and to create effective programs to prevent its transmission. The research work was carried out in two distinct project stages in wards 19 and 20 of KMC one from 1992-1996 (applying a traditional epidemiology approach) and a second from 1998-2006 (using an ecosystem approach to human health, overall, there were three main phases of activities in the development of the projects in Nepal: First an epidemiological investigative phase as just mentioned (1992-1996); Second an exploratory/analytical systemic phase focusing on linkages between social, ecological, and health variables (1998-2001); and Third a community action phase employing a variety of systemic, narrative, and participatory-action research tools (2003-2006) (Joshi et al., 2006).

Urban Ecosystem Health Project first phase was started in Wards 19 & 20 of Kathmandu Metropolitan City (KMC) from 1998 to 2001. National Zoonoses and Food Hygiene Research Centre focused then on epidemiological investigation of buffalo meat disease. Implementation of recommendations to break the cycle of disease transmission from this epidemiological perspective did not go very far. Butchers were not organized and did not see a valid reason to change, dogs were valued by the community and were not agreeable in killing them, the Ward offices and city government did not have the resources to implement a proper waste collection and management system on their own (Annual reports 1999-2009).

Following this study, a systems approach was used to explore the factors that were contributing to the occurrence and transmission of the disease, looking at social and ecological interactions related to the production and sale of meat in these butcher Wards. This approach revealed the interconnection in disease transmission between dogs, buffalo and butchers (Echinococcosis transmission cycle with open air slaughtering), the role of the meat sellers and consumers (cutting out cysts in the meat and giving them to the dogs in the street), and the role of waste collection and disposal (which implicated the street sweepers and Ward authorities). In sum, we realized that to prevent the disease it was needed to engage different actors in the community and

the ways they interacted with one another and their environment (Sanchez et al., 2001). This required a participatory approach to learning and behaviour change to reduce disease transmission. Engaging with them also needed negotiating needs and priorities among and between the different types of stakeholders. This, in turn, opened the scope of the project to address many pressing issues of community health through the same systems perspective of study (Cynthia et al., 2002).

General Objective

General Objective of the Urban Ecosystem Health Approaches (1998-2001) was to enhance the ability of the communities in wards 19 and 20 in Kathmandu to set in place sustainable process to identify, implement and monitor factors which will improve the health of the socio-ecological systems in which they live and ultimately human health.

Method of Study

The baseline family health survey study (August 1998 to July 1999) was carried out in ward no. 19 and 20 to understand the basic health information and indicators total 135 household members were interviewed. Based on the findings on the survey health and social intervention activities were chosen, resources were identified and training of the stakeholders by using PAR tools were began during the year 1999 to 2001.

During the year 2001 to 2002 socio demographic environment and health status survey was carried out in ward no. 19 and 20 of KMC a total of 250 household participants took part in the study. The survey was designed to determine the family health and environment status of people.

During the year 2003 and 2004 demographic family health survey in ward no. 19 and 20 of KMC was carried out in two phases. In ward no. 19 and 20 in first phase the team interviewed 117 households of specific stakeholders and in second phase in ward no. 19 and 20 again to 216 households of local people were interviewed.

Results

Most important is no open-air slaughtering with a very successful butchers & meat associations that are much better off than before and have now a national presence.

Improved community environments with less garbage, less pollution, more green spaces and environment conservation programs that are self-supporting. For example, the flower gardens are now run by a local committee in charge of maintaining the gardens, they sell the flowers and have a nursery and sell the seedling, as well as water and with these funds they maintain the gardens and make some income.

Health clinics serving the wards provide preventive and curative services, with their own building and laboratory facilities. The clinics have a recurrent budget from KMC, complemented by the ward office, and they charge a nominal fee for testing stools, blood, and examinations (reduce costs than hospitals), they also have a pharmacy to sell drugs with small markup (better prices than drugstores).

Perception on contribution to institutional development

Regarding the institutional development in the community a question on perception of contribution by the project was asked to n=32 stakeholders of which n=28 (87.5) said that there is a medium level of contribution, n=4 (12.5) said there was high level of contribution to institutional development as a result of the project (See detail in Figure 1).

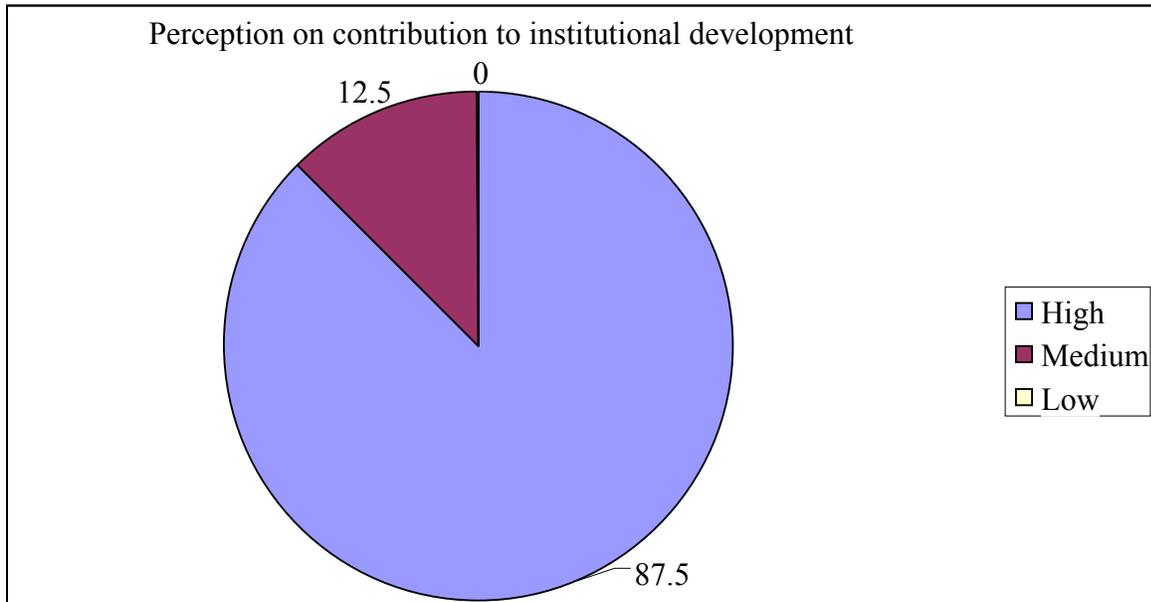


Figure 1: Perception on contribution to institutional development

Perception of changes from outcome synthesis workshop (2009)

A multi-stakeholder workshop to assess and reflect on the project outcomes was held in July 2009, and followed up with a limited survey of the 18 stakeholder groups engaged with the project. The following are some of the main observations made.

Perception on changes in health status after the project: this information was obtained from a small survey that included members from 18 different stakeholder groups (n=32). Out of which n=28 (87.5%) said health status was improved, n=4 (12.5) said that no change occurred and none said that the health situation deteriorated (See Figure 2).

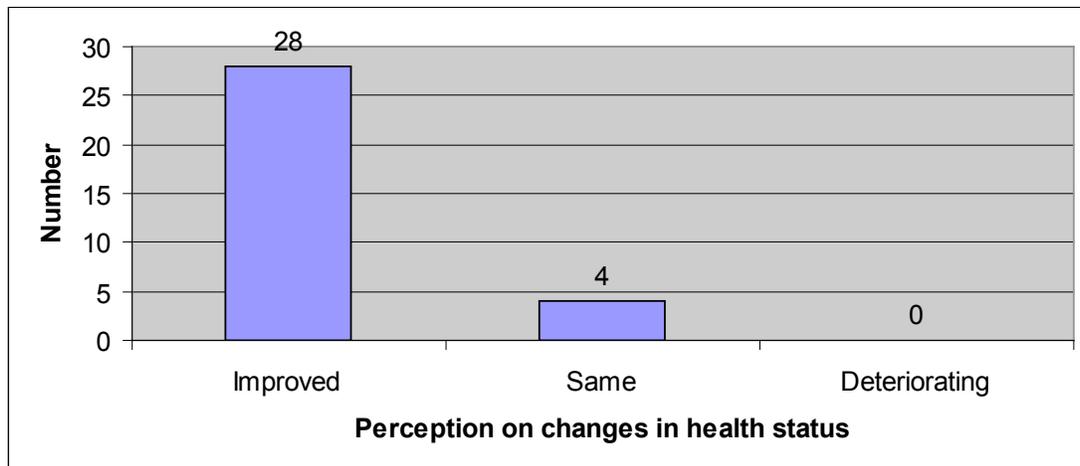


Figure 2: Perception on changes in health status

Perception of changes from outcome synthesis workshop

A multi-stakeholder workshop to assess and reflect on the project outcomes was held in July 2009, and followed up with a limited survey of the 18 stakeholder groups engaged with the project.

For the perception on changes in environment status a question was asked to n=32 stakeholders after the project of which n=30 (93.75) said that it is improved, n=2 (6.25) said same no changes and 0% said not deteriorating before and after the project (See Figure 3).

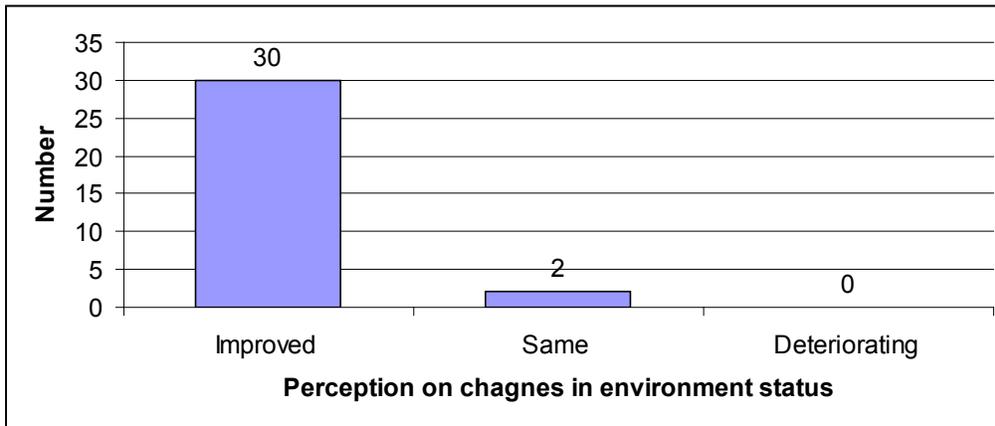


Figure 3: Graph is showing perception on changes in environment status.



Photo 3: Waste disposal centre turn into beautiful garden after the project.

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3. All the 18 stakeholders of ward 19 and 20 of Kathmandu Metropolitan City (MC)
4. All the staffs, consultants, advisor and resource person of NZFHRC.

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Panel Session Abstract : Solid Waste Management and Health in the Urban Context

In 2008, more than half of the world's population lives in cities and this ratio is likely to reach 60 per cent by the year 2050. The rapid expansion of urban environments has resulted in a concomitant generation and release of wastes that exert heavy pressures on surrounding and more distant ecosystems, particularly in developing countries. Hence the management of both solid and liquid waste, has emerged as a key environmental and social issue in these countries and poses critical challenges to municipalities that lack both the resources and capacity to create a clean and safe urban environment.

About 32 per cent of the world's urban population live in deep poverty in most life threatening environments or slums. Slum dwellers are exposed to significantly greater health risks mainly due to the lack of or limited access to clean water and sanitation, poor waste disposal including human waste, limited access to health services and public education.

This session will present applied, community-based research projects from around the world that use an ecosystem approach to address complex health-environment interactions in urban contexts. The research objectives are wide ranging, including analysing socio-economic and health risks factors related to waste management in urban areas, understanding the health impact of dumpsites on waste pickers and surrounding communities, understanding conflicting issues between waste recyclers and labour-related legal frameworks, and involving households and other key actors in waste management activities, in order to inform policies and practices and build research capacity in ecohealth.

Session participants:

- **Dr. Cheikh Fall** : Etude de l'impact de la décharge de Mbeubeuss sur la santé humaine à Diamalaye II (Malika), Dakar: une approche écosanté cfall@ised.sn
- **Dr. Gakenia Wamuyu Maina**: Sustainable Community-Based Interventions for Improving Environment and Health in Slums of Banda, Kampala City, Wamuyu_m@hotmail.com
- **Ruth Arroyo**: Examining the conflictive relationships between recyclers' work and Peruvian regulations, arroyo.ruthy@gmail.com
- **Dr. Emmanuel Ngnikam**: The precollection of domestic waste in areas with spontaneous habitation: an evaluation of a five-year experience in Yaounde, emma_ngnikam@yahoo.fr