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Participatory environmental diagnosis and of health risks from the surrounding communities the Petrochemical Complex of Rio de Janeiro, Brazil

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Abstract *The aim of this study was to diagnose the priority socio environmental problems and the health risks from the surrounding communities the Petrochemical Complex of Rio de Janeiro. Characterized by a participatory approach, the action research has led to the application of interviews, focal groups, meetings and workshop with social actors of Porto das Caixas and Sambaetiba districts, located in Itaboraí city/RJ from November 2013 to December 2014. A structural analysis of the problems prioritized by the communities (water supply, sewage treatment and risk of transmissible diseases; risk of air pollution and respiratory diseases; absence of public security and risk of violence) sketched out the cause-effect-intervention relationship, on the basis of the Protocol for Assessing Community Excellence in Environmental Health. The process revealed the absence of representativity of the social actors of the studied localities in spaces of decision-making on the environmental issue. Educational actions with professionals and inhabitants that aim to promote the formation of collective movements urge, indispensable to guarantee the rights of mitigation of situations of contamination of air and access to sanitation services and public security and thus of conditions of lower risk to health.*

Key words *Environmental impacts, Environmental health, Health risks, Petrochemical industry, Community participation*

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Introduction

The oil refining industry is considered an activity technically dangerous and highly impactant to the environment and to human health, and it must follow environmental quality standards for its licensing, as a good practice of socio environmental responsibility[1].

In Brazil, the oil industry has received increasingly investment from the Brazilian government through its Growth Acceleration Program. One of the most recent industrial enterprise is the Petrochemical Complex of Rio de Janeiro (Comperj), which was in the construction phase in Itaboraí city, boundaries between districts Alto do Jacu, in Sambaetiba, and Porto das Caixas, until the month of July 2015, when it was announced by the responsible company, Petrobras, that there would be more investment in Comperj due to the economic crisis that has struck the state company[2].

Historically, enterprises of the petrochemical sector in emerging countries have been located in environmentally vulnerable areas, and the construction phase has caused changes in the daily life of the territories, accentuating socioeconomic inequalities, suffering processes and diseases in the population of the surrounding area[3].

The socio environmental diagnosis should be included in the Environmental Impact Studies (EIA) for environmental licensing purposes of industrial enterprises with great potential of environmental pollution and risks to human life[4]. The World Health Organization has repeatedly recommended that the socio environmental diagnosis is developed on the basis of studies of community perception as an approximation mechanism of the community, of their practices knowledge, customs and values, as well as their participation in the identification, analysis and communication of the health impacts of project[5].

The research on environmental perception is an important instrument for the planning of actions and policies, given that one of the difficulties for the protection of ecosystems and of the social environment lies in the existence of differences of values perceptions, of theirimportance among the socioeconomic groups that have different tasks in the social plan, in these environments[6].

Despite the new worldwide perspective of participative socio environmental management that contemplates the perception and the participation of actors potentially affected by local problems of environmental health in the evaluation and decision-making[7], this seems to distance itself from the scientific production of collective health and concreteness of political actions in the national scenario[8,9].

In the process of COMPERJ´s environmental licensing, the environmental diagnosis included in its EIA has not included a study of community perception of environmental and health impacts[4]. This fact imposes real difficulties of social control and surveillance of health risks arising from the deployment of this enterprise.

In the context of COMPERJ´s conflicts and environmental impacts, in Itaboraí city, in function of their construction phase[10-12], urged the need to develop a study of socio environmental perception, aiming at opening democratic and dialogic spaces and the engagement of the communities surrounding the enterprise into the discussion of propositions centered on the environmental and health problematic. The present study aimed to diagnose, in a participative way, socio environmental problems and health risks from the surrounding communities the Petrochemical Complex of Rio de Janeiro.

Methods

This is a qualitative research, with participatory approach, which was held in the period from November 2013 to December 2014. It was resorted to the method of action research, that is relevant when it comes to deflagrate a participatory process, of visibility on environmental problematic scenarios and risky situations to health[8] and approximation of communities with political actors for apprehension and management of these problems[13].

This type of social research has been applied frequently in the field of environmental health[9,13], culminating in practices of social learning under a dialogical constructivist perspective and from the sharing of knowledges and strengthening community for the coping of collective problems[9,13].

The research scenarios were the districts of the Porto das Caixas and Sambaetiba, in the municipality of Itaboraí, metropolitan region of Rio de Janeiro state. Porto das Caixas is an area considered urban-rural with a population of 3.782 inhabitants[14]. The locality presents a Family Health Unit (FHU), four schools and an economy governed by small shops, sand industry, pottery and tourism due to the catholic religiosity. Sambaetiba is characterized as a rural area with 5,400 inhabitants[14] and has two schools, a USF, a

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basic traditional unit, local small businesses and many sites.

The Municipal Schools Simaco Ramos de Almeida, in Porto das Caixas, and Geremias de Mattos Sources, in Sambaetiba were selected, besides USF Porto das Caixas and USF Agrobrasil, in Sambaetiba, as access mechanisms and involvement of participants from both localities of this study. These districts consist of territories of COMPERJ surrounding and that, since the beginning of installation of his construction, in 2007, has been marked by social and environmental profound changes[10].

The research was operationalized in five steps. The Figure 1 shows in details the explanatory model, containing the steps of participatory process in the communities of the study.

The first step was the approximation and observation in the field, in which it had the opportunity to perform meetings for discussion on the feasibility of the project and logical methodological agreement for participation of representatives of local communities in the segments: Residents, health and education professionals, political actors responsible for services where the research occurred (USF coordinators and Education managers). This time, it was agreed that only professionals and residents would participate of the next step of the diagnosis, in order to value the daily life experiences anddeepen the understanding of critical processes lived in communities.

In the second step, 61 social actors participated in the research, including 05 key informants and 56 subjects of focal groups. It stands out the participation in a bigger number of teachers (20) than other segments (16 students, 13 inhabitants and 12 health professionals) due to the availability of the same to participate in the research. In relation to localities, it occurred almost a uniform participation in the study with 32 actors of Sambaetiba and 29 from Porto das Caixas.

Initially, open interviews were held with key informants, i.e. one resident, a nurse, a nursing auxiliary and two teachers of the selected services. This technique has served to strengthen relationships with social actors in the field, to raise evidences of the health impacts of projects or public policies, from the people´s anxieties and perceptions who know well the Community[5,15].

However, the interview has been applied, often, combined with grouping techniques, such

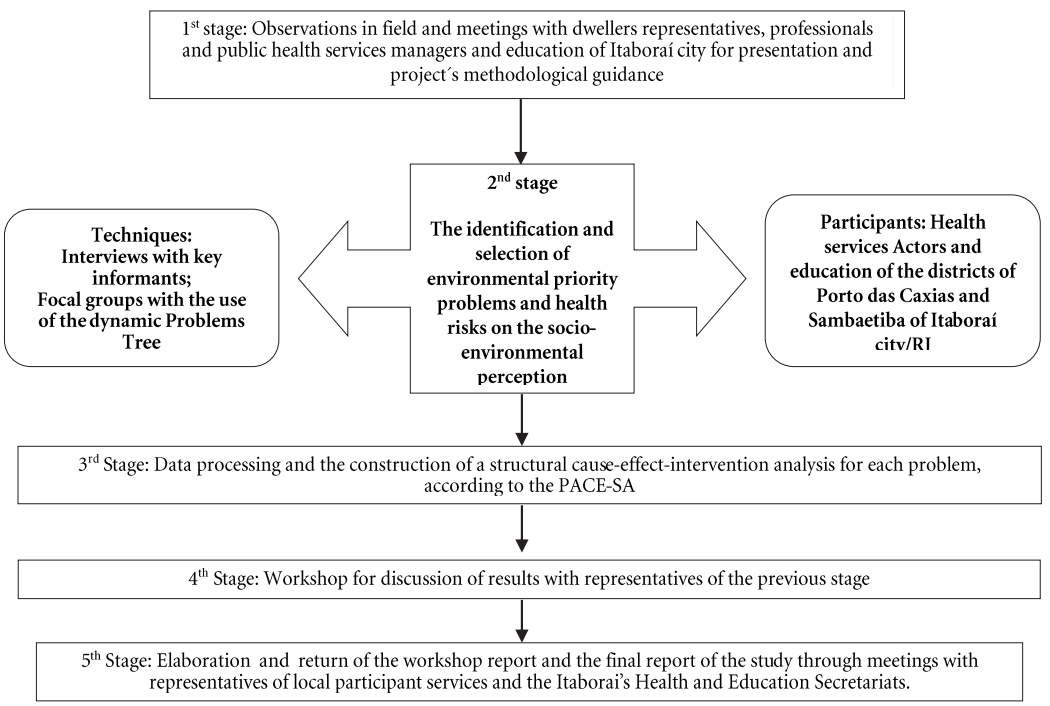

Figure 1. Explanatory model of the stages of participatory research and action in Environmental Health.

as focal groups, which contribute in the complementarity of the data[15] and deliver the collective learning based on the exchange between academicand popular[9] knowledge.

After the end of the interviews, 09 focal groups with 56 participants in total were gathered. The Groups 01 and 02 were constituted by residents; the Groups 03 and 04, by students; the Groups 05 and 06, by health professionals; and the groups 07, 08 and 09, by teachers. There was the intentionality of knowing the central problems that would be raised by each segment of actors, considering peculiar relations work-territory and living-territory[9,13].

The participants were identified by letters and numbers, as the result of the interviews (PE1, PE2...) or in groups (P1G1, P2G1, P3G1...), in order to ensure anonymity. It was possible to include students regularly enrolled in schools participating in this study, with ages ranging from 12 to 17 years, after authorization and signing of the informed consent terms by its leaders, in the moments before the completion of the groups.

The *Trouble Tree* strategy was adopted as dynamic in the 09 groups carried out, with the purpose to analyze the cause-effect-intervention relationship of each issue discussed[16]. In each group, three environmental problems were selected and classified, in order of priority and in a consensual way, in terms of frequency, severity and need for intervention measures. It was also discussed the scope of the problem, which was related to the impact in an environmental feature of collective importance, and their possible effects on health. Thus, each group drew in brown paper three trees and at the end, the results recorded in these trees were read to the participants.

The third phase aimed at the processing of multiple data, from the combination of various qualitative techniques, which demanded a systematization of triangulation[17] and it was based on the content analysis thematic[17].

The organization of the data produced in the groups, by means of the drawings, tape recordings and transcriptions of discourse, and the interviews, by means of the roadmaps, allowed the general problems classification. It was used the Protocol for Assessing Community Excellence in Environmental Health (PACE-SA)[7] as a benchmark for the construction of the analyses of the cause-effect-intervention relationship of the three socio-environmental problems prioritized by the communities.

The PACE-SA is a guiding document prepared by the American authorities, which has been useful for local issues evaluation of environmental health and to actions planning, based on community perception[7].

In the fourth step, the presentation and discussion of the results occurred, as a way of guaranteeing the data intersubjective reliability[17], by means of a workshop. This activity was conducted in November 2014. It was resorted to the technique of the workshop as a dialogical strategy that made it available the integration of representatives of different segments in this step of the knowledge production.

It is worth emphasizing that a representative of the residents, six professionals and five political representatives attended the workshop. In new contacts, the representatives have not demonstrated interest in participating of new workshops, except health professionals from Sambaetiba.

In the fifth step, it was elaborated the preparation, presentation and delivery of the workshop report and the final study report by the researchers in local participating services and at the Health Secretaries and Education of Itaboraí. This initiative aimed at the information disclosure as a way of devolution of participatory scientific practices, contributing to ensuring public accessibility to the data.

This study was an integral part of the research project entitled "Perception of socio-environmental impacts of COMPERJ and their impact on public health in Itaboraí city/RJ: the use of social technology in extension activities", which was approved by the Ethics Committee in Research of the National School of Public Health of the Oswaldo Cruz Foundation, in September 2013.

Results and discussion

The participatory diagnosis revealed three priority socio environmental problems with potential health risks: preoccupation with the water supply and sewage treatment; risk of air pollution; absence of public security, which emerged with the thematic categories described below.

Concern with the water supply, sewage treatment and risk of transmissible diseases

The most highlighted problem consisted of low coverage of public services of sanitary sewerage and water supply in the two studied communities. The cleaning and proper management of solid waste are also important sanitation re-

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quirements, although the participants did not mention as priority, except for a group of students that showed concern with the discard of household waste in rivers and pointed this fact as a frequent practice in their community.

The rainwater drainage, another topic of urban sanitation, was raised only as a target required for planning and political actions by Porto das Caixas ´participants. An analysis structure of the water supply problem and sewage system can be observed in Figure 2.

These are chronic structural problems of the municipality, but the study participants assign its worsening to the settling of COMPERJ and the population increment in the municipality, which can be seen from the increase in the population of the municipality in the order of 16.3% between the last two censuses of 2000 and 2010[14]. The speech below reflects this situation: *An Inn and many houses throw sewage in the streets, on the margin of COMPERJ, that is the reason for the increase of the amount of people and for the lack of sewage* (P4G7).

According to the data of the last demographic census of IBGE[14], only 40% (28.078) of 69.422 permanent private households in Itaboraí presented general sewer or pluvial net systems.

Another point highlighted by the participants was the issue of low coverage, the scarcity and poor quality of the water supplied by the system for the treatment of Companhia Estadual of Water and Sewage (CEDAE), as it is observed in the following testimonies: *They are using it and Cedae´s water lacks for Porto das Caixas* (P2G3); *Water comes from wells and from CEDAE, but this water from the wells never arrives* (P1G5); *CEDAE´s water only comes once a week, I think that has worsened with COMPERJ* (P5G3).

Such manifestations emphasize the concern of the population with the COMPERJ´s negative impacts on the lack of water in the region. Many residents reported that, due to the frequent lack of water supplied by CEDAE, they have reservoirs and tanks in their homes for water storage for consumption. Some also informed that, often, use two or more water sources, either because they are wary of water quality from CEDAE´net either because the interruption of water supplied by CEDAE obliges them to use various sources, such as the purchase of mineral water and the capitation of water in the wells.

The general data of the municipality, according to the IBGE census of 2010[14], show that, out of 69.422 permanent households, the water supply was done properly, by means of general distribution net, in only 18.750 households (27%). Improper forms, such as the use of wells or source within or outside the property, or the rain water storage, were used in 50.672 households (69.9%).

An important finding was the testimony of some participants on the decrease of aquifers hydric availability, after the beginning of COMPERJ´s works: [...] *We are also doing without well´s water after COMPERJ began* (P3G3); *Well´s water is drying, this has never happened* [...] (P5G8).

In Porto das Caixas residents informed that they were apprehensive with the water supply extension work by CEDAE, because some would need to be dispossessed of their homes and because this water supply widening would be for the good of Comperj and they would not be benefited from that. This concern is revealed in speech: [...] *They are about to build CEDAE´s dam to supply Comperj* [...] (P6G3).

The petrochemical industry is responsible for the consumption of large volumes of water and has accentuated the inequalities in the distribution and access to sanitation services to the population next to their installation place[18]. In the current situation, the access iniquities to these types of basic services persist as one of the structural problems in Brazil[19], being associated withhealth and life conditions worsening of the population, especially in vulnerable groups that live in the outskirts of large cities[20].

In terms of the perception of the effects of the problems related to water, the participants informed about the worsening of the river water and aquifer quality for domestic use, leisure, agriculture, in addition to the increased risk of transmissible diseases: [...] *Another aspect is the question of water: Our water is from well, it will have several diseases, this aquifer willbe polluted all over some years from now, if it is not already* (P2G8). *Nobody, Petrobras, government, are concerned to protect our rivers and wells. I think that we are already with the water without conditions for use, causing diseases* (P4G2).

The risk of marine fauna changes and of fish contamination from Guanabara Bay was mentioned and considered by an informant-key and a group of teachers as a result of contamination of the rivers Aldeia and Porto das Caixas, tributaries in the left margin of the basin of the river Caceribu, which flows into the bay by mangroves of the Guapimirim Environmental Protection Area. In this sense, some participants raised the need for the adoption of policies for the protection and recovery of water sources and aquatic

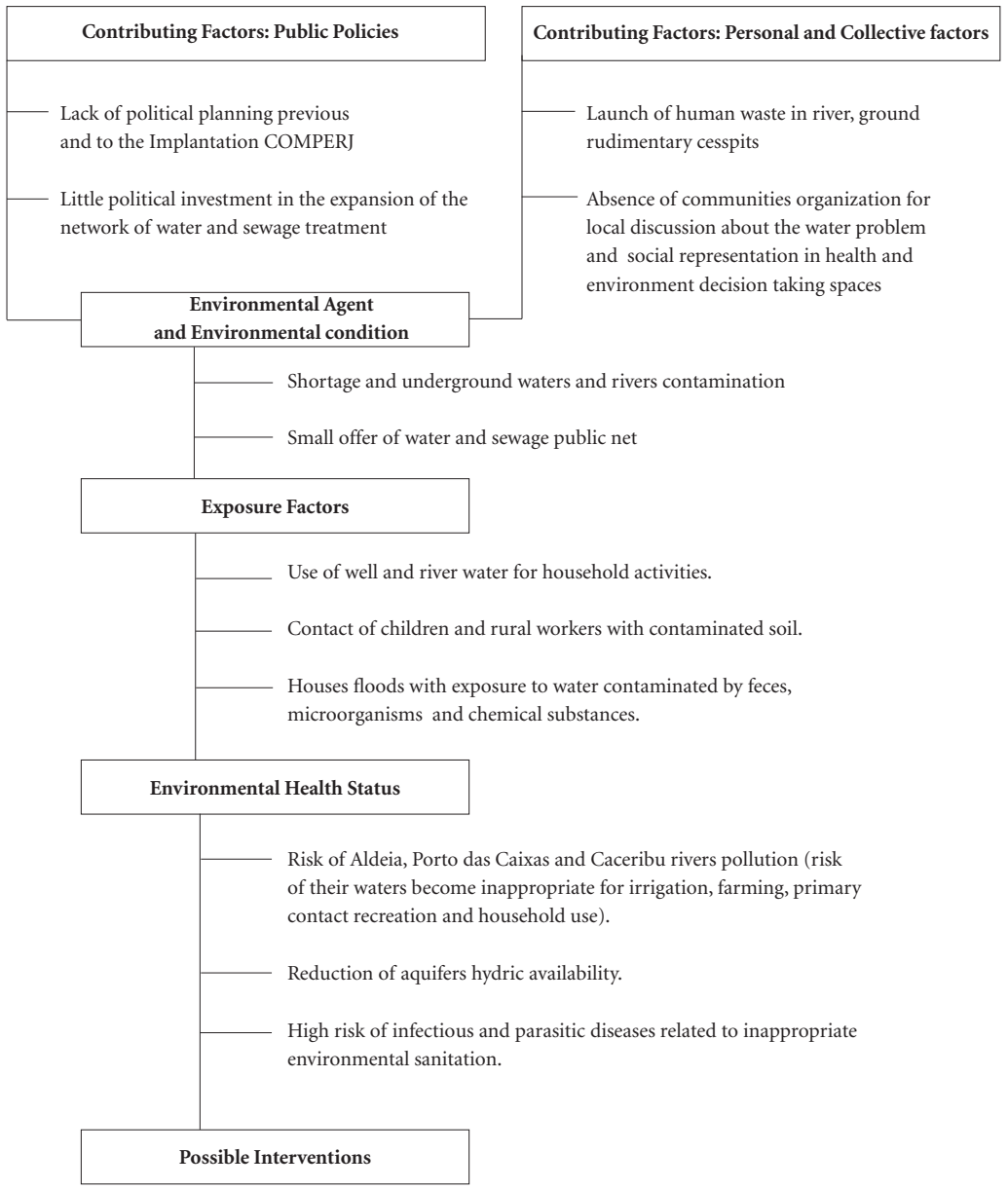

Figure 2. Structural Analysis of the water supply problem and sewage system, according to the Porto das Caixas and Sambaetiba communities, Itaboraí, 2014.

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communities. This perception is ratified by other authors[10,11].

It was found that, in all groups, there was risks perception of gastroenteritis, helminthic diseases and skin infections, especially in children, due to their greater contact with the contaminated soil. This finding is consistent with the literature, which has pointed out constantly precarious sanitation conditions as a determinant factor of diseases caused by pathogenic agents of hydric dissemination (acute enteritis, hepatitis, typhoid fever, etc.)[20,21]. The study by Torres et al.[21] concluded that diarrhea represented a high proportion (15.5%) of hospitalizations in children under five years of age within the period 2006 to 2009 in Itaboraí city.

Two dwellers correlated still the risk of dengue and leptospirosis with the household floods as a result of a lack of stormwater runoff and river and sinks dredging: *In here we have many floods in houses, drains and clogged rivers and everyone is afraid of mouse disease*[...](P7G3); [...] *The rivers and the houses are filled with the rains and this causes a lot of dengue fever also* [...] (P6G9).

Such perceptions are corroborated by Heller[20] who says that the application of measures to increase the coverage of sanitation services can reduce the transmission of pathogenic agents by the mechanisms of: consumption of contaminated water; inadequate hygiene and domestic staff; and insect vectors that reproduce in water.

It is noted that these statements about the risks of illness resulting from problems of water and sewage are products of daily experiences, as it usually occurs in the intuitive perception of the environmental risk and health between the lay population[22].

Health professionals were restricted to mention about the gastroenteritis and helminthiasis risk, not informing about the possible relationship between the emergence of other transmissible and non-transmissible diseases and the use of contaminated water[20]. Based on this fact, it is assumed that it is necessary the execution of permanent education actions with family´s health professionals of the municipality on the theme and publicizing the relationship between health and sanitation.

There are also poisoning risks resulting from the water use with the presence of contaminants (heavy metals, pesticides and volatile organic compounds etc.) originating from, generally, effluents and industrial waste, domestic waste, agricultural use and others[20], which were not considered by the participants of this study.

Social participation in the evaluation and intervention of the impacts of COMPERJ in water

It was observed that the participants of both studied communities reported never having participated of deliberative spaces and raised as a priority the need to begin to participate in concrete of these political spaces for planning and decision-making on issues related to the increased sanitation coverage , as they realized that the supervision of political actions for the application of funds in these services would only be possible through an effective social participation in these decision-making spaces .

The sanitation crisis in Brazil highlights the importance of the Community participation in deliberative organs at the areas of the environment and health and transparency on the part of the government authorities to share information on the situation of the environment with the population. Heller[20] highlights that the participation of communities affected by the problem of water scarcity in instances for decision making is the best way to minimize the impacts of the crisis, especially in health.

The participation of the affected community and its representativity in the deliberative spaces on environmental issues are also fundamental to guarantee their rights to health, which include human rights to their determinants, as well as access to drinking water[20].

However, there are still some critical nodes of inadequacies and precariousness in the social participation in decision-making processes of the environment and health in Brazil[23], including, when related to the phase of the environmental licensing of the petrochemical industry[18].

As it can be seen from the analysis of the participants, there were not spaces for discussion with the communities around COMPERJ's potential impacts by the competent authorities in the licensing phase. If they existed, as well as the public hearings for discussion of the Environmental Impact Study of COMPERJ, they were not published, evidencing low or no social participation in the discussion of the local problems. A participant considers this fact: *These hearings were not disclosed to the public, except a meeting that was open to Sambaetiba community* [...] (P2G6).

This finding is corroborated by Moyses[12], which queries that public hearings have served strictly for communicating decisions and formalize an "apparent openness of the participation of

civil society", and by Porto[8], which highlights that the affected populations, in general, have difficulties to participate in these public processes during the phase of environmental licensing of undertakings,increasing, therefore, the existing gap between the rhetoric and the practice of participative socio environmental management in the territories directly involved with the projects for industrialization.

In Brazil, managers and entrepreneurs manipulate and, many times, do not empower people to participate, or allow a citizen participation in symbolism level, dominated by an organizational hemogenic discourse and governability in the decision-making spaces on the potential environmental impacts and to the health of the enterprise[19].

Although this research had not as the initial proposal to raise issues of social participation, these have proved to be connected to the causes of water problem and the needs of community intervention, from the critical and reflexive construction of the groups. The absence of organization and professional's representativeness and residents was pointed out as a failure in the mechanism of social participation in decision-making spaces on the issue of water and other COMPERJ´s environmental impacts.

In critical line of thought about the influence of participation in decision processes, participants have raised doubts about the real participation of the representativeness of civil society in the forums and other spaces for discussion about the project, stating that this did not try to lead the aspirations and needs of their communities to these decision-making authorities: *There was not representative of our community in any forum or another place and, if there was, he did not discuss with agent on this water problem and that would worsen because of COMPERJ* (P6G3); *We do not have representatives, we need to organize ourselves* [...] (P4G9); [...] *They do not give space for us to choose our representative, so we continue without representative to go and discuss our problems* [...] (P3G7).

Corroborating this idea, other authors have shown that the representativeness of civil society in the Forum COMPERJ (Permanent Forum for the development of the area of influence of COMPERJ) showed to be forged and detached from the concerns and interests of the communities affected by the project[24].

The problem of the representativeness of civil society is replaced by the homogeneity of this category, resulting in an under-representation of different groups (group of fishermen, group of traders, resident's association, industry workers etc.), causing conflicts of interest. This fact was identified by Menezes[11] at the municipal forums of Agenda 21 Comperj.

The representativeness is considered one of the important dimensions of community capacity, because it is the medium through which the concerns and the social rights of the Community can be permeated between the interests and political interventions. Therefore, this problematic aspect underlies the representativeness to a contributing factor for worsening of socio environmental inequities[8], reinforcing the public deliberation more as a socially exclusionary practice reserved for more favored groups,reinforcing the decision-making power of the elite and political representatives[25].

Piterman et al.[23] declare the undoubted existence of advisers, representatives of civil society, which are coopted or subordinated by interest and by the power of a minority, resulting in a symbolic and manipulative participation that incapacitates not only the subject representative, but the whole share of the society to exercise control over the public policy of local sanitation.

The risk perception of air pollution and respiratory diseases

Another situation highlighted by the majority of participants (89% of the groups and 60% of respondents) was the worsening of the quality of the air in the municipality, after COMPERJ ´s implantation. The perception is that there has been an increase in the dispersion of dust, after the beginning of COMPERJ´s works, due to the increase of the fleet and the vehicles movement, tracks without paving, population growth and deforestation in the phase of earth moving machinery: *Air pollution here is blatant* [...] (P3G7); [...] *It increased a lot the quantity of dust, something that did not exist some years ago before COMPERJ* [...] (P1G8); [...] *This dust is also, in function of the streets that are not paved roads, and the absurd volume of trucks is another problem* (P5G3).

Only Sambaetiba area´s participants highlighted the deforestation as a factor related to possible air pollution: *We do not know if the trees replanting remained caused by deforestation because of COMPERJ* (P5G2); *Deforestation has worsened the air that is darker* (P3G8). This observation probably occurred, because of coexistence and of their daily contact with the Atlantic

Forest fragments existing there. The man´s contact with nature raises their perception about the beauty and the importance of the maintenance of ecological resources balanced for their own survival and good life quality[6].

In addition, Lima[26] also considered the existence of biomass burning in small, however, daily quantity by the ceramic industry as determinant of the great dispersion of dust, gravel and other particulates changing thus the air quality in Itaboraí city. This highlights the exposure risks of the population to particulate material and respiratory diseases. However, the smoke generated by various potteries (ceramic industries) was not perceived as a health and environmental risk.

It is assumed that the naturalization of this risk is a collective defense strategy that occurs in the communities exposed environmentally to a industrial hazard, since these cannot change the situation lived by a long period of time[22]. The outline analysis of the air problem can be observed in Figure 3.

Asthma was a health problem pointed as recurrent in children and adults from both locations*: I have friends and neighbors who are always in asthma crisis* (P3G7); *My daughter has asthma*

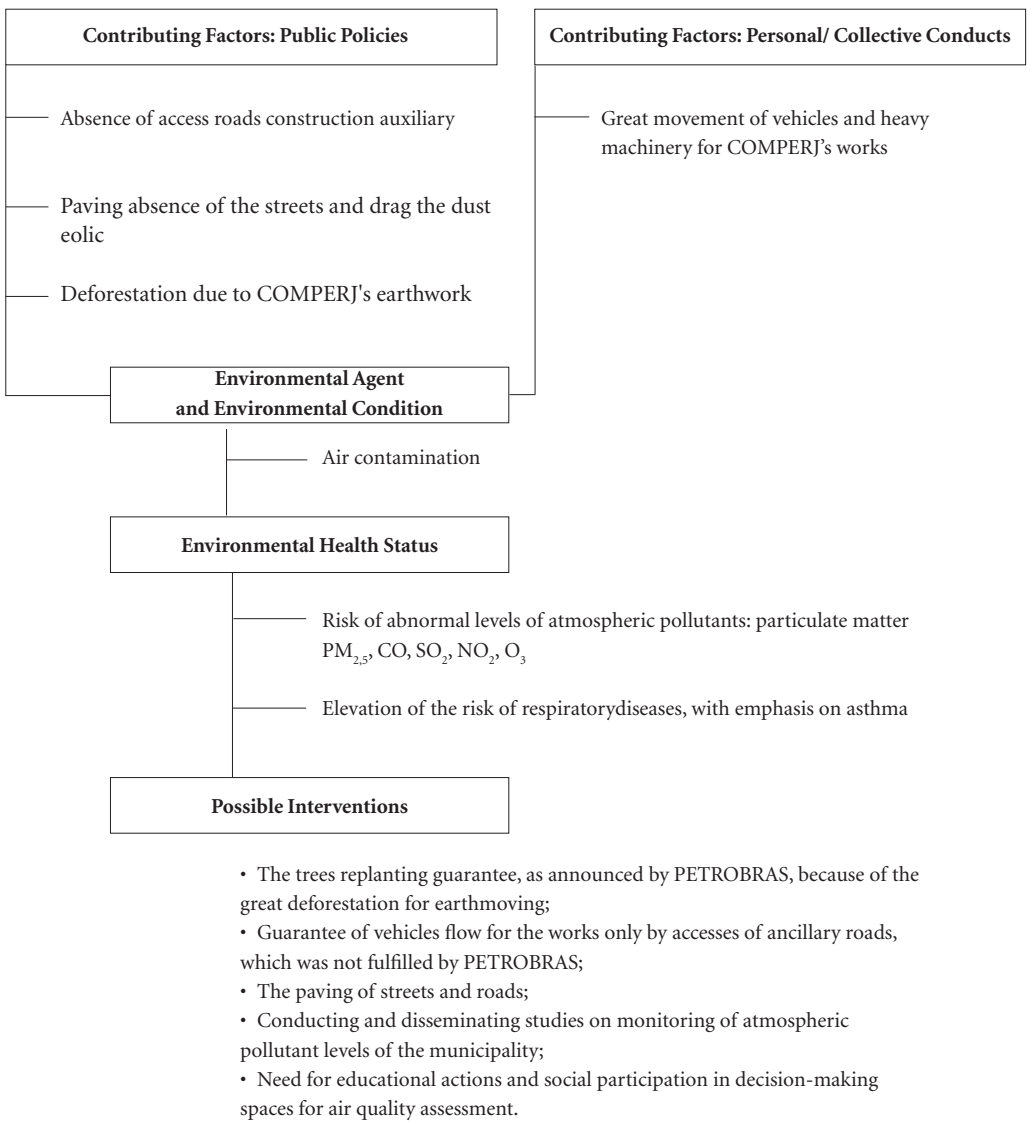

Figure 3. Structural Analysis of the air pollution risk and respiratory diseases, according to the Porto das Caixas and Sambaetiba communities, Itaboraí, 2014.

and I know many people here with allergic problems as well (P3G2). The elevation of this disease risk and its possible relationship with the situation of dispersion of the large amount of dust in the construction phase of COMPERJ was considered in all groups and Workshop: *It increased the chance of new asthma crises in my grandmother and in my son* [...] (P4G3); [...] *Because of this dust all now, bronchitis crises will worsen in children and other people* (P4G2).

This collective perception reiterated data from the study by Lima[26], which found a prevalence of asthma symptoms that ranged from 19.8% to 24.2% in adolescents in the most critical region (great potential for air pollution) of Itaboraí, which includes Porto das Caixas.

With respect to measures of minimizing the risk of respiratory diseases, the participants made reference to the need for specific policy interventions, such as: guarantee of treesreplanting, because of the great deforestation for earthmoving; guarantee of vehicle flow only by accesses of ancillary roads, which was not fulfilled by Petrobras; streets and roads paving; conducting and disseminating studies on monitoring of the levels of air pollutants of the municipality.

However, it has been clarified, once more, during group discussions, the importance of social participation in deliberative health and environment spaces. For that, education was perceived as a strategy of social transformation, of training for coping with conflicts and interests and search for social rights. Such perception meets the paradigm of environmental justice[8].

The environmental justice can be understood as a set of principles and practices whose assumptions are based on fair and equitable access to environmental resources of the country by the whole of society and on the warranty of the broad access to information essential for the constitution of collective movements that seek the reduction of socio environmental development risks that affect marginalized and vulnerable populations[8].

The perception of public security lacks and the violence risk

All groups and 60% of key-informants have considered that there was an increased risk of aggression, sexual violence, unemployment, prostitution and assaults after COMPERJ´s implantation: *Where were the individuals and families who worked in the ranches that were dispossessed, because the owners were reimbursed and the ranchers/ employees?? More unemployment, beggars, violence* (P1G7).

The workers living in precarious conditions in areas surrounding COMPERJ were pointed out as a risky situation, in relation to physical and sexual violence: *A lot of strange people, many workers, men living on rented house, take the girls, rape them* [...] (P2G1).

The understanding of this problem culminated in the risk perception of sexually transmitted diseases, which was placed as a worrying situation by teachers, students´ leaders and by the students themselves because of prostitution and the risk of sexual violence near COMPERJ: *The risk of AIDS and other diseases may increase because of rape and prostitution* [...] (P1G2). This health risk is common in resident populations in territories surrounding refineries in construction phase[3].

Among the causes for the insecurity situation, was mentioned the absence of leisure areas and culture in the localities of the study, since that such absence can determine idleness in young people, drugs use and trafficking and, still, physical and sexual violence[27].

Another possible risk factor of the pattern of violence for the majority of the groups (78%) is due to the periodic interruption of the works and the large number of workers´resignations: *All the time there is workers´strike and layoffs and where do these people go? To the streets, because many people do not have how to return (P1G8); The crime has grown a lot, these people come from outside to work here and at a determined moment the contract terminates and they become unemployed and what are they going to do? They Use drugs, more prostitution* [...] (P2G6); [...] *They dismiss people, who do not have a place to live, causing more slums, drugs use, more assaults here* [...] (P3G3).

The feeling of insecurity has also been related by the participants to the increase of traffic accidents risk and trampling due to lack of road signs, traffic cops and the disregard of bus drivers and trucks from companies that are directed to COMPERJ´s works: [...] *The trucks drivers do not respect the inhabitants, there were tramplings* [...] (P2G7); *A new risk perceived was the trucks explosions: COMPERJ caused a truck explosion in the tollgates, deaths and still new explosions may occur* [...] (P3G7).

These reports show the fear of the population under the impact occurred and the risk of new trampling and new explosions of vehicles, possibly due to the inability of the drivers and to a lack of supervision of vehicles transporting loads for the COMPERJ's works.

Although such situations of environmental risks will continue to impact the populations health in industrialization contexts in the entire Brazilian territory, applications and interventions, academic and social policies are still quite limited in the fields of worker health and environmental health, accentuating the vulnerabilities of certain social groups[16].

Substantially, the environmental risks identified contribute to deface the initial territory and the feeling of well-being of the population, generating psychological problems such as anxiety, depression and excessive concern with the deterioration of the environment and life conditions[3].

Policing and local employability measures were some of the propositions pointed to minimize the issue of insecurity affecting workers and residents of the territories surrounding COMPERJ. The outline analysis of the problem of public security was described in Figure 4.

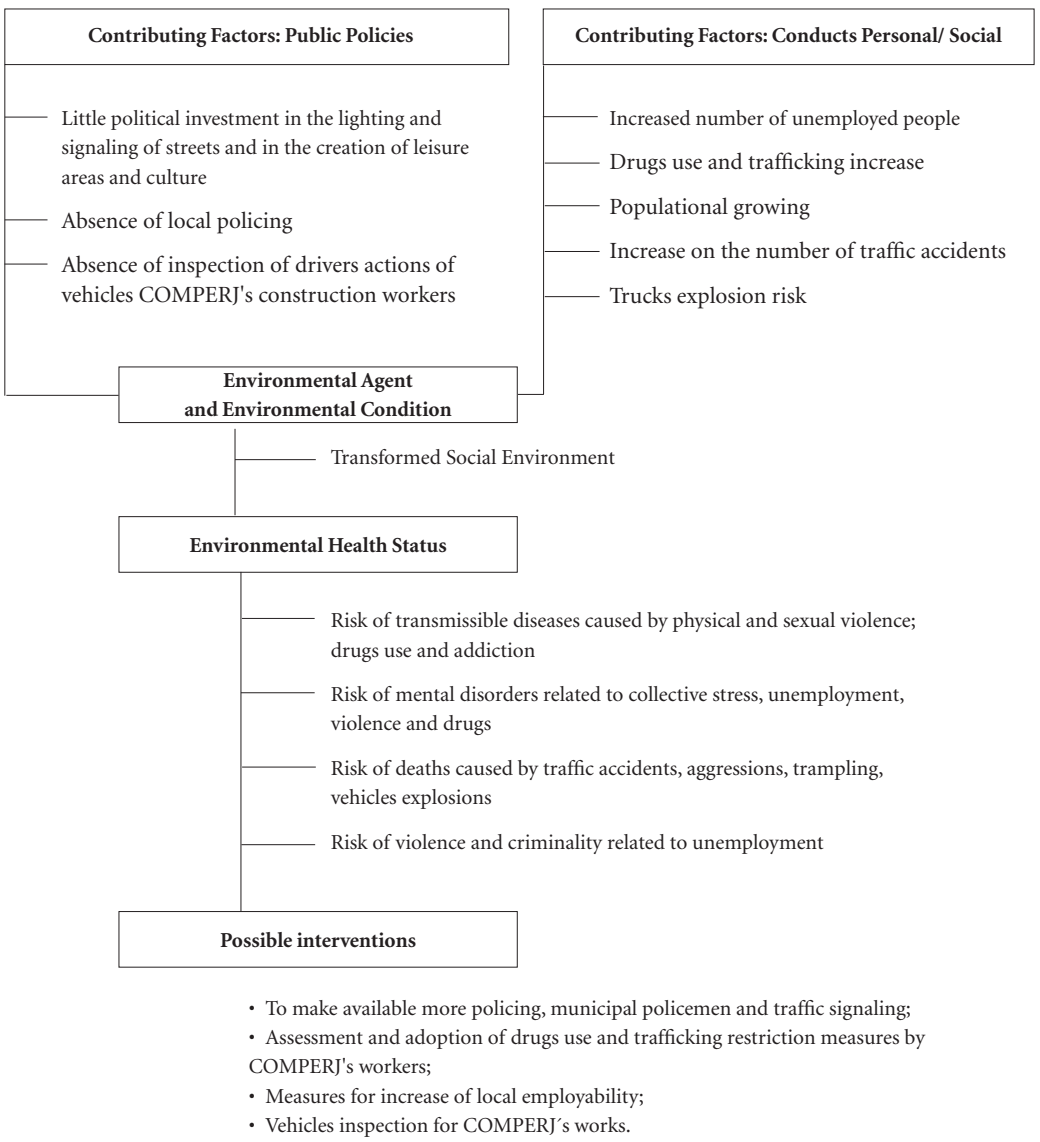

Figure 4. Structural Analysis of public safety absence, according to the Porto das Caixas and Sambaetiba communities, Itaboraí, 2014.

Conclusion

In conclusion, we can say that COMPERJ´s construction was pointed out as the cause for the deterioration of environmental conditions and production of old risks (gastroenteritis, asthma, etc.) and new health risks (deaths by violence, drug use, explosions etc.) in the surrounding communities COMPERJ.

The lack of professional's representativeness and residents in decision-making spaces on the environmental problems revealed that educational actions urge that promote the creation of processes of ecological and sanitary awareness and collective movements, fundamental to ensure rights for mitigation of air contamination situations and access to sanitation services and public security.

In this way, the social actor's perception in their work and housing relations, when taken into account in social environmental diagnosis studies, can clarify flows and territories´ life social dynamics for the effective ownership of problematic situations experienced and contribute to the community strengthening in defense of environmental conditions of lower risk to health.

Collaborations

MA Moniz worked in the conception, methodology and in the data analysis, in critical review and approved the version to be published; VM Sabóia, CN Carmo and SS Hacon worked in the data analysis, in critical review and approved the version to be published.

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