

OBJECTIVES OF SUSTAINABLE DEVELOPMENT AND CONDITIONS OF HEALTH RISK AREAS¹

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1. Introduction

Many world leaders recognize issues such as climate change, biodiversity loss, poverty or increase in tropical epidemics as limiting factors of development in low-income countries. However, these problems are seen usually in isolation, such as environmental or social adversity, with no real understanding of what its causes are linked to changes in the ecological and social systems, i.e. sustainability issues. This generates an insufficient awareness of the root causes and results in an underestimation of the magnitude of its challenges, including the continuation of efforts unsustainable practices that enhance the systematic decline of the potential of ecological and social systems (BROMAN; ROBERT, 2017).

In general terms, the concept of Sustainable Development is the result of awareness of the global links between growing environmental problems, socio-economic issues related to poverty, inequality and concerns with a healthy future for humanity (HOPWOOD; MELLOR; O'BRIEN, 2005). It is noticed that the evaluation of a problem of sustainability does not dissociate the ecological systems of social, on the contrary, integrate them

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and because they are interrelated, require integrated solutions (UNSDSN, 2017). This is clear in the action plan of Agenda 2030, where 17 of the Sustainable Development Goals (SDG) and their 169 goals, integrated, indivisible and balanced in environmental, economic, social and institutional are inserted. Developed from the legacy of the Millennium Development Goals (MDGs), it brings action for the next 15 years, in search of a sustainable and resilient world (UNSDSN, 2017).

Health, Objective 3 in Agenda 2030 shows its relevance, but also their interrelation with the problem of eradicating poverty (Goal 1), food security (Goal 2), sanitation (Goal 6) and inequality between countries (Goal 10). It is important to understand that all the objectives of sustainable development are products of socio-geographical territory, whose reach targets depends on the location of the integration with the global.

Contributor to the economic growth of society, health is an indicator of progress of nations in achieving Sustainable Development (FAIRALL; BATEMAN, 2017). Promote health at all ages, inserts benefits that extend across generations. Thus, the inclusion of health as one of the SDG brings recognition to be a key to human development, with vast and multidimensional social determinants.

In this perspective, this article aims to analyze the relationship between sustainable development and health conditions in hazardous areas. Therefore, we conducted a survey in Mindará neighborhood of Bissau, capital of Guinea-Bissau in Africa. As contributions to those working on the theme, the study brings the systematization of data on the social determinants of health in an extremely poor region information, in context. As methodological approach was chosen for the construction of aggregate indices: Disease Occurrence Index (DOI) Access Index Health Services (AIHS) and Sanitation Index (SI), which showed a state of precarious sanitary infrastructure basic and public health in Mindará neighborhood. The survey also showed social determinants of health, such as poverty (Goal 1 SDG) and hunger (SDG Objective 2) on the population, which insert a higher level of complexity in the actions necessary for the country to fulfill the SDG. After all, the conditions in which we live and work influence the health of a population. It thus appears that improving health depends on joint and coordinated action in other SDG.

2. Objectives of sustainable development in low-income countries

The SDG are integrated and indivisible, comprehensive and universally applicable in nature, considering the different situations, capabilities and national levels of development, as well as national policies and priorities of each country.

There is a finite amount of resources as well as increasing impacts which reveal that the actions for the implementation of sustainable development need to be on two fronts: local and global. In many cities of Sub-Saharan Africa, the measures taken toward sustainable development have improved some services, but there is neglect of potentially relevant actions for the poor (HOPEWELL; GRAHAM, 2014). There are areas where the daily population also seeks to satisfy their most basic need – to eat. Meanwhile, in other countries, their populations are attentive to needs that will still emerge as the new fads.

In low-income countries, almost all 17 SDG need to be implemented, including the most basic – Goal 1, Eradication of Poverty, and Goal 2, Zero Hunger – thus demonstrating greater challenges than those existing in other countries. After all, in these places, it is not just economic growth that would allow the inclusion of sustainable development but also a distribution of income subject to masters of their own destiny, aware of its power to citizens and bring about change. To do this, other SDG have to be met, such as Goal 4 – Quality Education.

It is obvious that there are many challenges in the implementation of sustainable development when each country has its own political, economic, social and environmental landscape. Sustainable development is configured as a new way of thinking and acting towards a future that is secure, prosperous and has the possibility of opportunities and rights for all. Its success requires a bold approach, which entails the involvement of all social actors in addressing the challenges of the future.

Discussions on the sustainable development agenda for the coming years have directed special attention to the importance of health as a condition for the success of public policies, highlighting the challenges of fighting disease and the little attention paid to the subject (DORA et al., 2015).

3. Health and sanitation: the reality of Guinea-Bissau

The main problems facing humanity relating to health are part of a community's life, whether attempting to monitor communicable diseases, controlling and improving the physical environment (sanitation) and drinking water supply, or food with quality and affordability. With all of these items health is interrelated, showing its multidimensionality and need for understanding of a holistic and interdisciplinary approach.

Urbanization means an increasing proportion of the population lives in urban areas as opposed to rural areas. Currently, more than 54% of the world population lives in cities (INTERNATIONAL ORGANIZATION FOR MIGRATION, 2015), whose formation and growth occur through the influx of population for economic, political or religious reasons. However, if more than two-thirds of the world population lives in urban areas by 2050 (UNITED NATIONS, 2014), one cannot forget that these cities will need to meet the basic needs of this population. It is necessary to ensure the integrity of ecosystems in the face of climate change and yet promote economic productivity and social inclusion – one of the main challenges of our time. However, the rapid growth of urban population without proper planning leads to several problems, among them the lack of basic sanitation.

In 2015, 47% of the population of South Asia had improvements in sanitation facilities, compared to 22% in 1990. Meanwhile, in Africa's Sub-Saharan region, progress was much slower, with only an improvement from 24% in 1990 to 30% in 2015. In 47 countries, less than half of their populations had access to a toilet or a latrine. In addition, about 13% of the world leaves their waste in the open. This situation was much more visible in the countryside; however, due to overcrowded cities, has spread to urban areas. As a result, 58% of all diarrheal deaths in low - and middle -income countries result from

the inadequate water or complete lack of sanitation (WORLD HEALTH ORGANIZATION, 2015). Among the urban environmental problems, sanitation remains a major challenge in the cities, and it has direct implications for the health and well-being of a population (RAMASWAMI et al., 2016).

Health is defined as a result of feeding conditions, housing, education, income, environment, labour, transportation, employment, leisure, freedom, access and land tenure and access to health services (NATIONAL HEALTH CONFERENCE, 1986). However, even health being a right does not always guarantee compliance by the State, especially when there are no public policies for the sector. Thus, the full exercise of the right to health implies ensuring work in dignified conditions, food according to the needs of each individual, hygienic and decent housing, education in its various forms, quality environments, safe and affordable transportation, leisure and security, people's participation in the organization, management and control of the services, and actions aimed at health and freedom (NATIONAL CONFERENCE OF HEALTH, 1986).

Social Determinants of Health (SDH) are related to the conditions in which people live and work, including the social, economic, environmental, cultural and ethnic factors that influence the occurrence of disease and risk factors in a population such as lack of housing, food, education, income and employment (ANDRADE et al., 2010; BUSS, SON PELLEGRINI, 2007; FIOCRUZ, 2017). According to the World Health Organization, SDH are, in summary, the social conditions in which people live and work (WORLD HEALTH ORGANIZATION, 2011). This is because the diseases are primarily determined by a number of socio-economic factors that increase or decrease the risk of contamination, including the existence of basic sanitation infrastructure that improves the quality of life (MONTGOMERY; ELIMELECH, 2007).

It is evident that the existence of sewage disposal is critical to the health of the population because it minimizes the risks and frequency of diseases associated with sewage. Likewise, access to the collection of household waste promotes the management of solid waste, a harmful pollutant that favours the proliferation of vectors of disease and environmental contamination. The existence of sewage networks enables the reduction of diseases related to water contaminated by faecal coliforms (BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS, 2015).

Diarrhoea, yellow fever, leptospirosis and mycosis, among others, are diseases related to inadequate sanitation. The level of precariousness of the water supply, sewage, collection and disposal of solid waste and urban drainage create risks to the health of the population, mainly the poorest social strata who dwell in unhealthy environments.

The existence of adequate health infrastructure mitigates the socioeconomic and environmental factors and contributes to the reduction of associated diseases, making it an excellent mechanism for sustainable development (BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS, 2015), which is why it is included as one of the objectives of sustainable development (Goal 6). It is evident that sanitation involves socioeconomic actions that aim to achieve environmental health through a set of actions that promote the use and transformation of urban soil and in turn, the control of vectors transmitting diseases, in order to promote the health and well-being of a population.

Guinea-Bissau is one of the 54 states in the African continent, covering a surface of 36,125 square kilometres of the vast territory of the West coast of Africa (GUINEA-BISSAU, 2005). It borders two Francophone countries: The Republic of Senegal to the north and the Republic of Guinea in the east; the south borders the west coast of the country, which is bathed by the immense Atlantic Ocean. With a population of approximately 1.8 million people, the life expectancy of people in Guinea-Bissau is 54 years. Ranked as one of the poorest countries in the world, the main economic activities include agriculture and fishing, and the state's weaknesses lie in infrastructure and production structures (THE WORLD BANK, 2017). Portuguese is the official language, and the most widely spoken language is Guinean Creole, which is used to help in communication between Guineans. However, there are many ethnic groups, among which six are worth mentioning: Fula, Balanta, Mandinka, Manjaco, Pepel and Mancanha. Three religious groups have greater importance than others: Muslims, Christians and animists. The ethnicities divide social systems and guide the social, political and religious views of the population, including the perception of the disease definition (CÁ, 1999).

The country went through a long period of wars in order to become independent from Portugal, and independence was only achieved through armed struggle in 1974. Yet, the population still lives with conflicts, which in turn promote instability of governments and hamper the organization of cities as well as urban planning.

On the issue of health infrastructure, the country has three hospitals – the Simão Mendes National Hospital, Military Hospital (Guinea-Bissau /China) and Three August – and some specialized centres: Hospital Raoul Follereau (tuberculosis), Leprosy Hospital Cumura (leprosarium), Mental Center (psychiatry), Motor Rehabilitation Center and Maternal and Child Reference Center (CRMI), almost all located in the capital, Bissau. The regional hospitals are located in Canchungo, Mansoa, Bafata, Gabu, Bolama and Catió, and locally, there are health centres and base units.

The country, however, still lacks statistical information from a number of sectors, which is why Guinea-Bissau was not included in the Global Sustainable Development Goals Index in 2016 (UNSDSN, 2016) and 2018 (UNSDSN, 2018).

4. Methodology

The data analysed in the survey are of primary origin, obtained through the application of 200 forms with the residents of the neighbourhood Mindará in Guinea-Bissau who were chosen randomly and with records of its coordinates recorded by the Global Positioning System (GPS). In addition to the application form, systematic observations of the locality and photographs were taken. The form strictly followed the rules of the Ethics Committee and was approved with the CAAE 52325215.10000.5054 code.

The data were organized into groups of indicators: socioeconomic characteristics, health and access to basic sanitation infrastructure (Table 1). Such indicators have sought to address the need to operationalize the Sustainable Development Goals through clear and unambiguous messages able to describe the conditions of a system analysis (HAK; JANOUŠKOVÁ, MOL DAN, 2016).

Table 1 - Mindará Neighborhood Indicators analyzed in the research.

Analyzed appearance	indicators
Socioeconomic characteristics	Level of education of the household head
	Occupation of head of household
	Number of people living in the household
	Number of residents working
	Family income per capita / day
	Condition as to the possession of the residence
	residence time
	Number of children at home (under 12)
	Number of young people at home (between 13 and 18 years)
	Number of children in school
	Number of young people in school
	Access to durable goSDG (stove, refrigerator, TV, phone, computer, ...)
	Number of bedrooms
bathroom of existence	
Health conditions	health post of existence
	health care quality
	Care by health worker at home
	Frequency of residents to the clinic
	verified diseases at home
	Age of affected residents for diseases
	Disease symptoms observed among residents
	Disease Occurrence Index (DOI) - <i>proxy</i> the risks of residents to epidemiological diseases (aggregates the information on the occurrence of diseases in the household).
	Access Index Health Services (AIHS) - <i>proxy</i> the supply and quality of health services Mindará neighborhood (adds information relating to the health services available to residents).
Access to Sanitation Infrastructure Basic	Residence building type
	Final disposal of human waste
	Type of tank
	Fossa maintenance frequency
	Existence of solid waste collection
	Garbage collection existence
	Existence of points accumulated garbage in the streets or land nearby
	Final Destination trash
	Type of water supply
	Treatment of water
	Occurrence of flooding during the rainy season
Basic Sanemanto index (SI) - <i>proxy</i> the sanitation condition in the households of the neighborhood Mindará (adds information concerning basic infrastructure necessary for the health of the population).	

Source: Elaborated from survey data.

From the respective indicators and calculated data, there are three aggregate indices: Disease Occurrence Index (DOI), Index Access to Health Services (IAHS) and Sanitation Index (SI). The construction of the aggregate indices involved three steps: i) selection of indicators able to grasp the meaning of what is to be measured; ii) operation of these indicators in order to make them quantifiable; and iii) aggregation of indicators by mathematical procedure. Table 2 contains the component indicators of each index and its operation.

Table 2 - Composition and operation of the Disease Occurrence index (DOI), Index Access to Health Services (IAHS) and Sanitation Index (SI).

Aggregate index	Indicators	Operationalization
Disease Occurrence index (DOI)	Malaria case at home	YES = 1 and NO = 0
	Dengue case at home	YES = 1 and NO = 0
	Cholera case at home	YES = 1 and NO = 0
	Case of infectious diarrhea at home	YES = 1 and NO = 0
	Case of yellow fever at home	YES = 1 and NO = 0
	Case of typhoid fever at home	YES = 1 and NO = 0
	$0 \leq 1 \leq \text{DOI}$ (the closer to 1 the higher the vulnerability of the household to the occurrence of disease)	
Access Index Health Services (AIHS)	Access to health post	YES = 1 and NO = 0
	Good quality health care	YES = 1 and NO = 0
	home health care agent	YES = 1 and NO = 0
	$0 \leq \text{HSAI} \leq 1$ (the closer to 1 the greater the access of residents to health services)	
Sanitation Index (SI)	Bathroom Existence of residence	YES = 1 and NO = 0
	Sewage existence in residence	YES = 1 and NO = 0
	Fossa maintenance realization	YES = 1 and NO = 0
	Existence of collection of solid waste by the city	YES = 1 and NO = 0
	Weekly rubbish collections	YES = 1 and NO = 0
	Garbage existence nearby home	YES = NO = 0 and 1
	Existence of tap water	YES = 1 and NO = 0
	Realization of some treatment of drinking water	YES = 1 and NO = 0
	Occurrence of flooding during the rainy season	YES = NO = 0 and 1
	$0 \leq 1 \leq \text{SI}$ (the closer to 1 the better the basic household sanitation condition)	

Source: Elaborated from survey data.

The operation consisted of assigning scores to the respective categories of responses for each indicator. Thus, from binary logic, values have been assigned One (1) when the answer was given by the respondent (household head) and matched the expected favourable situation, and 0 (zero) when there was not an appropriate situation. It should be noted that in the case of the Disease Occurrence Index (DOI), the expected situation is the occurrence of disease, which is why we assigned scores one (1) to the occurrence of disease at home and 0 (zero) to non-occurrence. In relation to this index, we selected the composition of the six most common diseases in the neighbourhood. Other diseases researched, such as schistosomiasis and leptospirosis, were not included because there were no identified cases among respondents.

Aggregation followed the procedure adopted by Sousa, Lima and Khan (2015):

$$IA_j = \frac{\sum_{i=1}^n ESC_{ij}}{\sum_{i=1}^n ESC_{maxi}} \quad (1)$$

in which:

AII = Aggregate index for the j -th home.

ESC_{ij} = score assigned to the i index in the j -th home (0 or 1).

ESC_{maxi} = maximum possible score to be assigned to the i indicator (in the case of search = 1)

$j = 1, \dots, m$ corresponds to the popular household survey (1, ..., 200).

$i = 1, \dots, n$ corresponds to the component indicators Aggregate Index (DOI $n = 6$ to $n = 3$ to $n = 9$ for AIHS, SI).

5. Results

5.1 Diagnosis of environment in Mindará Quarter, Guinea-Bissau

Bissau, the capital of Guinea-Bissau, is made up of 46 districts, of which Mindará is noteworthy as the site of the Pepel ethnic group and one of the largest markets in the country – Bandim (GUINEA-BISSAU, 2015). Their households have an average of seven people. This is because the neighbourhood is commercial and populated by many foreigners from neighbouring countries who do not care about quality structures. Most children and young people over 12 years old attend school. However, regarding the level of education, 33% of the respondents had only finished elementary school, and 25% had completed secondary school, which shows that the vast majority of householders do not have the level of advanced education.

Low levels of education directly influence informal jobs. Thus, 32.5% of the respondents engage in informal trade, 24% carry out domestic activities, and the student population is 13%. About 73% of the respondents own their own homes, while 20.5% of the houses are rented and only 6.5% are borrowed. The high number of owned homes is

due to the occupation of the neighbourhood by people of Pepel ethnicity at the beginning of the construction of the Mindará neighbourhood when families built their homes. Leased or borrowed houses represent changes in recent years in the Mindará neighbourhood where the presence of foreigners is growing. To work in the region, they seek homes for lease or even loan in the short and medium periods of time.

As for family income, it was found that over 50% of the population interviewed received an average of less than US\$1.00 per day, which resulted in poverty and inability to meet the basic needs of nutrition, health, education, housing and longevity. They reported that had only two meals a day. Thus, the informal trade helps them to survive and support their families.

Among the existing consumer goods, the television was the most common, with 56% of households owning one, while the refrigerator was second, present in 41.5% of households. This partly masks the problem of lack of availability of electricity in homes, as well as insufficient family income for the purchase of various household appliances.

Regarding the type of housing, 92% of the local population had rudimentary buildings made of mud, with zinc coating or straw and cement floors. Most houses have two bedrooms, which corresponds to 29% of the total surveyed. The one-bedroom accounted for 26%, the three-bedroom 21%, the four bedroom 9.5% and more than four bedrooms corresponded to 13.5%. Even so, in a residence which would fit up to 7 people at the most, it is possible to find from 10 to 15 people.

The bathrooms are built in a rudimentary way and are usually located outside the residences which mostly have latrines without toilets. In homes that do not have bathrooms (7.5%), residents dump their waste in the alleys of the streets or places of street waste build-up.

The environmental diagnosis reveals how people live and work in Mindará neighbourhood. To better understand the possible relationship of these characteristics to health, we calculated the following indices discussed above.

5.2 Disease Occurrence Index (DOI) and Access Index Health Services (AIHS)

The population of Mindará neighbourhood is often affected by a number of diseases such as malaria, dengue fever, cholera, infectious diarrhoea, typhoid fever, yellow fever and associated local environmental characteristics (Table 3). Among these diseases, malaria is endemic, with stable transmission and high prevalence in the country for years. According to data obtained in this study, 67.5% of the interviewed population suffer from malaria. Some residents are more affected by the diseases analysed and some less. Indeed, those aged 5–18 years are highly vulnerable.

Table 3 - Frequency distribution of disease cases by age of the population in Mindará neighborhood.

Disease	Children under 5 years	Between 5 and 18 years	Between 19 and 35 years	Between 36 and 50	Over 50 years	Total (%)
Malaria	5.2	40.7	21.5	17.8	14.8	100.0
Dengue	23.0	23.1	15.4	15.4	23.1	100.0
Cholera	0.0	33.4	33.3	33.3	0.0	100.0
Infectious diarrhea	10.0	55.0	25.0	0.0	10.0	100.0
Yellow fever	4.2	41.7	20.8	20.8	12.5	100.0
Typhoid fever	3.5	44.8	20.7	20.7	10.3	100.0

Source: Prepared from survey data.

This identification becomes more complex because Mindará does not have health centres, forcing its inhabitants to go to the neighbouring district or the National Simão Mendes hospital. In this bleak context, 90% of the programming and operation of the Ministry of Public Health (MINSAP) continues to depend on the availability of funds and external resources.

The DOI is the percentage of occurrence of disease at home, considering the six most common diseases among the residents of the Mindará: malaria, dengue, cholera, infectious diarrhoea, yellow fever and typhoid fever. Thus, a higher value of DOI means that at home there were cases of different diseases, which means high exposure to pathogens.

Table 4 displays the average DOI values of different population groups. The poorest households had higher averages on the DOI (0.223), i.e., its residents are more vulnerable to diseases than those with higher incomes. On the other hand, when comparing households with regard to the level of education of the household head, it is clear that in this neighbourhood, education level is not a differentiating factor of vulnerability to disease.

Table 4 - Average values of Disease Occurrence Index (DOI) and the Health Services Access Index (HSAI), by population group according to per capita income and level of education.

Disease Occurrence index (DOI)		
household income per capita / day (US \$)		
Condition of destitution (<1US \$ / day / person)	Condition of Extreme Poverty (≥ 1 US \$ / person / day and <second US \$ / person / day)	Above the extreme poverty condition (≥ 2 US \$ / day / person)
0.223	0.151	0.143
Degree of Education		
To elementary school	High school	Higher education
0.173	0.229	0.167

Mean values of the Health Services Access Index (HSAI)		
household income per capita / day (US \$)		
Condition of destitution (< 1 US \$ / day / person)	Condition of Extreme Poverty (≥ 1 US \$ / day / person and < 2 US \$ / day / person)	Above the extreme poverty condition (≥ 2 US \$ / day / person)
0.534	0.495	0.476
Degree of Education		
To elementary school	High school	Higher education
0.503	0.514	0,667

Source: Prepared from survey data.

Note: * significant difference 0.01. According to Tukey test group indigent condition is statistically different from the other groups to render a 0.05 significance level.

Accessibility to health services is continuous and can meet the real demands of the residents of Mindará. The high incidence of disease among residents of the neighbourhood is compounded by the absence of good coverage for health services. Most residents have access only to services provided by health workers. Only 8% have hospital care and 2.5% receive care at the health centres. Health services had low levels of care and insecurity, causing residents to have to move to Badim, a neighbouring district, where they can find a health centre. The 66.5% attended by health workers represent the homes that have children under 5 years old who have monitoring done by an international non-governmental organization. The absence of health facilities in the district makes the health worker acquire a relevant role in reducing disease. However, the on-site search investigation inferred that this service does not cover even half of the residents.

With the objective of analysing residents' access to health services globally, the Access Index Health Services (AIHS) was created. The comparison of the average values of the AIHS by income class and level of education of heads of households, shown in Table 4, indicates that there is no significant difference between the groups with regard to access to health services.

With regard to income groups, people with higher incomes demanded health clinic services and the aid of health workers to a lesser extent. Moreover, they are relatively more demanding regarding the quality of care. Thus, in households whose residents have higher per capita income (above the poverty condition), there is a tendency to have a small AIHS score, while people with higher levels of education tend to recognize and value more access to health services in the district.

The results show that the population of Mindará neighbourhood is vulnerable to a number of diseases and devoid of a good surveillance system able to meet the specific demands of each disease. Socioeconomic and environmental characteristics may be related to disease processes, i.e., social determinants of health. It was noted, for exam-

ple, that lower levels of income are associated with higher risk of diseaseⁱ. However, the household income is only one factor for explaining the vulnerability of the population to endemic diseases.

5.3 Sanitation Index (SI)

The deficiency in health infrastructure is another complicating factor that affects health promotion where infectious diseases continue to cause mortality. The Mindará neighbourhood presently has poor sanitation infrastructure. In all the households, waste is thrown in pits; however, they are poorly constructed or wrongly installed, which contributes to the contamination of the groundwater supplying wells in the area. This dangerous condition is revealed in 86.5% of households of the people interviewed in the Mindará neighbourhood, who stated they use only septic tanks, while 13.5% use the cesspit.

As for the infrastructure, specifically with regard to the maintenance of the tanks, it was found that 84.5% said they do not maintain the tanks, which shows the lack of awareness of the district's population regarding its importance. This lack of awareness may be related to the low level of schooling of most residents, as well as the lack of finances to bear the costs of maintenance.

There was an important report that 40% of the costs of the Bissau City Council are directed at basic sanitation, not specifically infrastructure, but to payment for services, such as rentals of trucks, tractors and payments to personnel. In 2015, the Waste Management Project Municipal Solid in Bissau (GRSU-Bissau) was launched in partnership with the European Union, which would pay 90% of the cost, and the remaining 10% would be paid by the city of Bissau (GUINEA-BISSAU, 2015).

Solid wastes that are generated by the residents of Mindará are dumped in the main thoroughfares of the city. Aside from accumulating, the garbage just spreads elsewhere by wind, rain, animals or even anthropogenically, bringing risks of epidemics to the region in question.

The collection of regular rubbish is practically non-existent in the neighbourhood, where 99% of the population said that there is no garbage collection. Sometimes garbage collection is run by the residents themselves, who have only one vehicle donated by the city of Bissau (CMB). On the issue of the final destination of waste, 94.5% of those interviewed said that the garbage was put on the streets at the garbage areas mentioned above, since there is no waste collection in the neighbourhood by public organizations.

Even with 98% of respondents answering that they have tap water in their homes, it is derived from wells in the neighbourhood which are subject to bad conditions for storage and treatment. Approximately 62% of respondents do not have treatment of water for consumption, while 27.5% receive treatment with chlorine. Most of Guinea-Bissau wells only receive treatment with chlorine, because there are no qualified people to teach how to treat the water.

On average, households had SI corresponding to 0.434, or not even reaching 50% of the ideal condition of sanitation (SI = 1.0), which best corresponds to the expected position under the nine components of SI indicators. It was observed that half of the households had SI of at most 0.444. Finally, the coefficient of variation of less than 30%

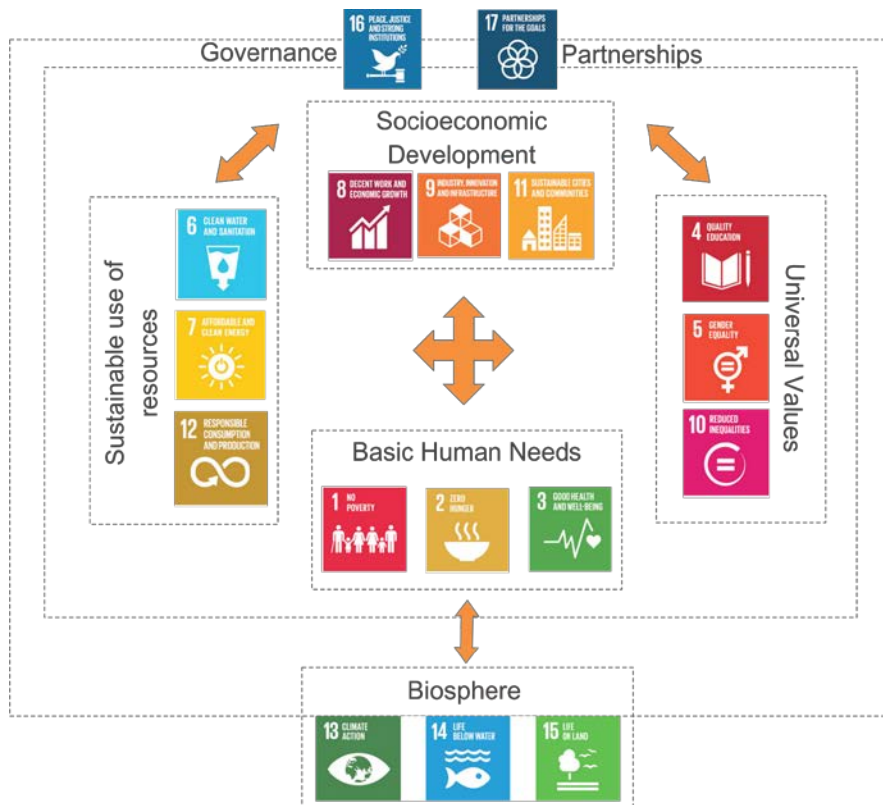
suggests that the heterogeneity among households is not high with regard to the conditions of sanitation. Similar results were obtained by Park et al. (2016). These researchers emphasized the importance of measuring access to basic sanitation services as a way to support interventions for disease control.

The environmental diagnosis as well as the implementation of aggregate indices in this study show results that corroborate the data from the World Health Organization (2016), in which resources and infrastructure of water and sanitation, poverty and income inequality, and education and governance remain in Guinea-Bissau as social determinants of health, limiting the achievement of the goals of sustainable development.

5.4 Integration of health conditions for the Sustainable Development Goals (SDG) in risk areas

The SDG are revealed as opportunities to break paradigms. Unlike the Millennium Goals, the SDG are distributed into the four metrics of sustainability (Figure 1). It has been confirmed that goals can only be met in an operationally stable, secure and resilient system that visualize their integration.

Figure 1: Integration of Sustainable Development Goals.



Source: Adapted from Stockholm Resilience Center (2017); IIASA (2017).

To this end, the economy and ecosystem subsystem (CECHIN, 2010) need to be efficient in order not to be limiting variables in ecosystem resilience. Resilience to sustainable development involves the ability to sustain their progress, so many ways, to minimize their vulnerability. Thus, vulnerability is a function of exposure, sensitivity and the ability to adapt to changes ahead, which requires knowledge of the elements that expose the system to the risks (ADGER, 2006; BIRKMANN, 2006).

Faced with the risk of information can prevent and mitigate losses, maintain the living conditions of a population and recover from suffered impacts. An area is considered risky when it is unfit for human settlement, either due to natural hazards or human actions. In these places, the vulnerability permeates the way of use and occupation of soil (SPINK, 2014). Therefore, Mindará is revealed as a clipping an area of risk to human settlement.

The insertion of aggregate indices in the DOI survey AIHS, and SI managed to capture the risks to the achievement of the Objective 3 goals – Health and Wellness – Sustainable Development. Poor sanitation infrastructure, high numbers of residents per household, low education and income among the householders, and a high infant mortality rate affect the goal. These results also sum up the cultural factors and the conflicts in Guinea-Bissau. In risk areas such as Mindará, there are many SDG to be achieved, especially those falling within the basic human needs. Thus, implementation, management and the scope of SDG face far greater challenges.

The aggregate indices – DOI, AIHS and SI – fulfilled their purposes, better contextualizing the local reality in multidimensional aspects associated with Goal 3 (Health) of the objectives of sustainable development. Although the data in this study cannot assume that existing diseases are a direct consequence of poor health infrastructure conditions in Mindará, the results do not exclude the importance of health infrastructure in reducing disease. There were several social determinants of health that could not be scored in this research because of the absence of data or the difficulty of access.

This research can, however, conclude there is an immense fragility in the public health system in Guinea-Bissau, where the improvement of the quality of life is a challenge for the city's managers, requiring a holistic look aimed primarily at an integration of some objectives of sustainable development – Goal 1 (eradicate poverty), Goal 2 (Food Security), Goal 6 (Sanitation) and Goal 10 (inequality between countries). In Guinea-Bissau, health is intricately linked to the said objectives. Strategic plans of government need to include the logic of integrating these goals, not prioritizing one and discarding the others. After all, health is a multidimensional problem, dynamic and spatially variable.

Note

i Spearman's correlation coefficient between the variables per capita/day and Disease Risk Situation Index (DRSI) = -0.193 (significance level 0.01).

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OBJECTIVES OF SUSTAINABLE DEVELOPMENT AND CONDITIONS OF HEALTH RISK AREAS

Abstract: The paper analyses the relationship between sustainable development and health conditions in hazardous areas. Therefore, we conducted a survey in Bissau, capital of Guinea-Bissau, Africa. The main methodological procedures were the Disease Occurrence Index (DOI), Access Index Health Services (AIHS) and Sanitation Index (SI), which allowed the quantitative analysis of the relationship between health and sanitation with regard to the Sustainable Development Goals (SDG). The main results showed that the targets of Goal 3 – Sustainable Development, Health and Welfare – are threatened due to lack of sanitation infrastructure, low education and low income. In hazardous areas, as studied in the article, health demands permeate several SDG.

Keywords: Sustainability, Health, Aggregate Indices.

Resumo: O artigo busca analisar a relação entre Desenvolvimento Sustentável e condições de saúde em áreas de risco. Para tanto, foi realizado um *survey* em Bissau, capital de Guiné-Bissau, África. Como procedimento metodológico principal foram construídos: Índice de Ocorrência de Doenças (IOD), Índice de Acesso a Serviços de Saúde (IASS) e Índice de Saneamento Básico (ISB), os quais permitiram analisar quantitativamente, e na perspectiva dos Objetivos do Desenvolvimento Sustentável (ODS), a relação entre saúde e saneamento. Os principais resultados mostraram que as metas do Objetivo 3 do Desenvolvimento Sustentável, Saúde e Bem-Estar, encontram-se ameaçadas devido à falta de infraestrutura de saneamento, baixa escolaridade e baixa renda familiar. Em áreas de risco como a estudada no artigo, as demandas por saúde perpassam por diversos ODS, especialmente aqueles voltados para atender às necessidades humanas: Objetivo 1 (Erradicação da pobreza), Objetivo 2 (Segurança Alimentar), Objetivo 6 (Saneamento) e Objetivo 10 (Desigualdade entre países).

Palavras-chave: Sustentabilidade, Saúde, Índices Agregados.

Resumen: El artículo busca analizar la relación entre las condiciones de salud y el desarrollo sostenible en zonas de riesgo. Se realizó una encuesta en Bissau, capital de Guinea Bissau, África. Como procedimiento metodológico fueron construidos: el Índice de ocurrencia de enfermedades (DCI), el Índice de Acceso Servicios a la Salud (IASS) y el Índice de Saneamiento (IS), lo que permitió analizar cuantitativamente y bajo la perspectiva de los Objetivos de Desarrollo Sostenible (ODS) la relación entre salud y saneamiento. Los

principales resultados mostraron que las metas del Objetivo 3 de Desarrollo Sostenible, Salud y Bienestar, están amenazadas debido a la falta de infraestructura de saneamiento, baja escolaridad y bajos ingresos familiares. En las áreas de riesgo como la estudiada en el artículo, las demandas por salud están incluidas en varios ODS, especialmente los orientados a satisfacer las necesidades humanas: Objetivo 1 (Erradicación de la pobreza), Objetivo 2 (Seguridad Alimentaria), Objetivo 6 (Saneamiento) y Objetivo 10 (Desigualdad entre países).

Palabras clave: Sostenibilidad, salud, índices agregados
