METHODOLOGICAL PROPOSAL TO EVALUATE PUBLIC URBAN GREEN SPACES

DIOGO GUEDES VIDAL[1,2], CLÁUDIA OLIVEIRA FERNANDES[3,4], NELSON BARROS[1], RUI LEANDRO MAIA[1]

[1] UFP ENERGY, ENVIRONMENT AND HEALTH RESEARCH UNIT (FP-ENAS), UNIVERSITY FERNANDO PESSOA, PORTUGAL
[2] CNPq RESEARCH GROUP "DYNAMICS OF NEUROMUSCULOSKELETAL SYSTEM", BAHIANA SCHOOL OF MEDICINE AND PUBLIC HEALTH, BRAZIL
[3] DEPARTMENT OF GEOSCIENCES, ENVIRONMENT AND SPATIAL PLANNING, FACULTY OF SCIENCES, UNIVERSITY OF PORTO, PORTUGAL
[4] RESEARCH CENTER IN BIODIVERSITY AND GENETIC RESOURCES (CIBIO INBIO), PORTUGAL

INTRODUCTION

Cities must be pleasant and healthy spaces able to contribute to ecosystems regeneration and to bring closer Humans and Nature. However, cities are unequal spaces regarding the distribution of environmental resources, resulting in environmental injustice: socioeconomic vulnerable areas are, simultaneously, those where is identified the bigger environmental vulnerability (1,2), in part due to the poor quality of public green spaces - resulting in poor air quality and the increase of noise level – and the social segregation. Therefore, the present work aim to present a methodological proposal to evaluate urban green spaces quality.

MATERIAL AND METHODS

A grid to evaluate urban green spaces was elaborated with the main objective to characterize them according to the elements considered essential (3) in terms of performed activities, environment quality, infrastructure / facilities and safety level (Table 1).

TABLE 1 - EVALUATION GRID

DIMENSIONS	
GREEN SPACE	Name, Location, Opening Year, Size And Typology.
OBSERVATION	Generic Description Of The Activities That Are Happening In The Green Space.
PERFORMED ACTIVITIES	Sports, Table Games, Theatres, Civic Participation Meetings, Festivals, Concerts, Religion And New Spiritualities, Environmental Education Or Others.
ENVIRONMENTAL QUALITY	Assessment Of Surrounding Area Quality, Trees Density, Air Quality, Noise Level, Cycle Lanes, Paths, Maintenance And Typology Adopted, Cleaning Routine, Art And Heritage Elements, Vandalism, Water Elements And Shadow Spaces.
TURES/FACILITIES	Existence Of Environmental Education Centre, Children Playground, Proximity To Car Park In The Surrounding Areas, Proximity To Public Transport, Resting Spaces (Benches), Containers With Bags For Animal Manure, Fountains, Sources Of Water For Animals
INFRA	With Reduced Mobility.
SAFETY	Visibility Level Of The Streets That Surround The Park (Exterior-indoor/Interior-exterior); Identification Of: Areas Of Difficult Visualization, Adequate Infrastructures For Sports Activities, Lighting And Security/Vigilant/ Surveillance Existence.

The city of Porto is divided into 7 parishes that differs in social and environmental vulnerability. In a recent study (4) 74 public parks and gardens and 21 squares were identified, totalling 95 public green spaces. In order to create a representative sample of green spaces, the Socioeconomic and Environmental Deprivation Index (5) was applied, dividing the city into five clusters that oscillate between "Very low vulnerability" and "Very high vulnerability". The grid was applied in five gardens and urban parks selected from each cluster and validated by (Table 2).

STUDY AREA

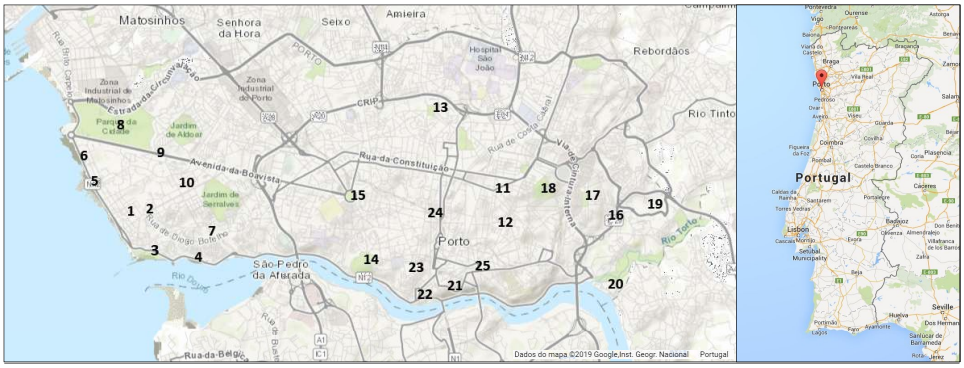

TABLE 2 – URBAN GREEN SPACES SAMPLE

LEG.	SOCIOECONOMIC VULNERABILITY	URBAN GREEN SPACE	TYPOLOGY
1	Very Low	Jardim Da Praça Do Liège	Garden
2	Very Low	Jardim Da Praça Do Império	Garden
3	Very Low	Jardim Passeio Alegre	Garden
4	Very Low	Jardim Do Cálem	Garden
5	Very Low	Jardim Do Homem Do Leme	Garden
6	Low	Jardim Na Avenida De Montevideu	Garden
7	Low	Parque Da Pasteleira	Park
8	Low	Parque Da Cidade	Garden
9	Low	Jardim Na Avenida Da Boavista/Rua Pinho Leal	Garden
10	Low	Praça D. Afonso V	Square
11	Moderate	Jardim Da Praça Rainha D. Amélia	Garden
12	Moderate	Jardim Paulo Vallada	Garden
13	Moderate	Jardim Arca D'água	Garden
14	Moderate	Jardim Palácio De Cristal	Garden
15	Moderate	Rotunda Da Boavista	Square
16	High	Jardim Na Rua Do Falcão	Garden
17	High	Jardim Da Praça Da Corujeira	Garden
18	High	Parque De S. Roque	Park
19	High	Parque Oriental	Park
20	High	Jardim Da Praça Das Flores (Avenida 25 De Abril)	Garden
21	Very High	Jardim Na Rua Duque De Loulé	Garden
22	Very High	Jardim Na Praça Do Infante D. Henrique	Garden
23	Very High	Jardim Da Cordoaria	Garden
24	Very High	Jardim Da Praça Da República	Garden
25	Very High	Jardim S. Lázaro	Garden

Results

Reliability measures (Table 3) were performed in order to measures reliability, namely how well the grid measure the quality of public

= 0.837) (6). In all items domains α = 0.8, suggesting that the grid is a consistent tool to evaluate the quality of public green spaces. Intraclass correlation coefficient (ICC) was used to measures the reliability of ratings or measurements for clusters reliability analyses. A high ICC close to 1 indicates high similarity between values from the same group. In this context, our results are excellent (ICC= 0.837).

TABLE 3 – RELIABILITY MEASURES RESULTS

Global Cronbach's Alpha		Strength	ICC
0.837		Good	0.837 (Excellent)
Cronbach's Alpha By Domains		**Strength**	
Performed activities	0.825	Good	
Environmental quality	0.841	Good	
Infrastructures/Facilities	0.833	Good	
Safety	0.827	Good	

Conclusions

The elaboration and validation of this grid to evaluate the quality of public urban green spaces tool shown to be a valid and reliable tool

died. The main expectancy of this work is the

onitoring quality urban green spaces in order to adjust them to citizens social and environmental needs.

References

1. Hoffimann E, Barros H, Ribeiro AI. Socioeconomic inequalities in green space quality and Accessibility—Evidence from a Southern European city. Int J Environ Res Public Health. 2017.
2. Vidal DG, Maia RL, Vilaça H, Barros N, Olilveira GM. Green Spaces and Human Rights: to an environmental justice in urban space. Book of Abstracts of the 2nd Internacional Conference in Ethics, Politics and Culture: Human Rights, Faculty of Arts and Humanities of the University of Porto. Porto, Portugal, 26-27, 2018.
3. Broomhall, M. H., Giles-corti, B., & Lange, A. Quality of Public Open Space Tool (POST). Perth, Western Australia: School of Population Health, The University of Western Australia. 2004. Retrieved from http://www.see.uwa.edu.au/research/cbeh/projects/post.
4. Farinha Marques P, Fernandes C, Lameiras J, Leal I, Silva S, Guilherme F. Morfologia e Biodiversidade nos Espaços Verdes da Cidade do Porto. Caderno 1 - Seleção das áreas de estudo. CIBIO-UP, editor. Porto; 2014.
5. Monteiro A, Sousa C, Fonseca L, Almeida M, Velho S, Carvalho V. Atlas da saúde e da doença – vulnerabilidades climáticas e socioeconómicas na Grande Área Metropolitana do Porto e Concelho do Porto. CHERG, editor. Porto; 2013. 167 p.
6. Pestana MH & Gageiro JN. Análise de Dados para Ciências Sociais. A complementaridade do SPSS, 5ª edição revista e corrigida. Lisboa, Edições Sílabo, pp. 527-528, 2008.

Acknowledgments: FP-ENAS research is funded by *FCT – Fundação para a Ciência e a Tecnologia, I.P.* through project UID/MULTI/4546/2019