

# Light Pollution, Have You Heard About It? Measuring Knowledge About Light Pollution In Lima, Peru

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**Abstract:** Cities with a high content of light pollution are illuminated 24 hours a day, this generates light pollution. Light pollution does not only the vision of people, but also affect the animals of the place, who find themselves in the need to migrate to other areas, darker where they can perform their daily activities, with greater insecurity for them. This study aimed to measure the level of knowledge of the light pollution, data collected from 384 people living in Lima, Peru was examined. Findings suggested that in general, only 4% of people interviewed have high knowledge of what light pollution is, while 20% had medium knowledge and 76% of people interviewed had low knowledge of the subject.

**Index Terms:** Logo program, speech-therapy, phonological awareness, language, speaking, Peru.

## 1. INTRODUCTION

We live in the 21st century where technology has advanced enormously, giving way to the technological era. Generally, it is perceived in urbanized, suburban and industrial areas light pollution, and the actions to counteract it are aimed at doing everything possible to find actions that leave the dark skies, as they were thousands or even millions of years ago. The problematic reality of the study starts from the effects produced by the light of the cities. Which affect not only the vision of people, but also affect the animals of the place, who find themselves in the need to migrate to other areas, darker where they can perform their daily activities, with greater insecurity for them. Cities with a high content of light pollution are illuminated 24 hours a day, sometimes with spotlights or luminous signs of too many colors that can affect vision because they are too intense. It should be noted that if lighting installations are poorly designed or poorly installed, they can be costly and inefficient, creating many problems, including glare and energy waste. The uses of light reduce the opacity of the sky, and like the current problem of plastic in the seas, perhaps at the beginning (today), is not considered a major problem, but it will be for future generations. This scientific article is framed within the sustainable goals of the UN (9) industry, Innovation and Infrastructure and 11) sustainable cities and communities-. As a background, it is pertinent to show national and international works, which will be detailed baselines. A thesis by Vera [1] whose objective was to determine whether visual pollution affects proposed regulations in wanchaqs - Cuzco districts, having as a conclusion 10 visual pollution agents were determined. This is what they are: -Commercial Advertising, -Advertising Not

Removed, -Accumulated Solid Waste, -Excessive Wiring, - Construction in Bad States and Dismantling, -Outpatient Trade and Exhibition of Material on Public Roads, -Paint, Graffiti and Advertising, -Eriaza Zone and -Other. Montalvan [2], presented a thesis whose objective was to analyze if there was advertising where the visual contaminations access in the cities of Iquitos, Peru 2012, the conclusions to which such arrived: Four types of advertising are identified being found in the cities of Iquitos: poster or posters, banderole, sign and simple panels. 2. There are visual contaminations by advertising that affect men, resulting in the following: headaches, bad moods, nervous system alterations and visual saturations, also affect the environment producing alterations in the aesthetics of urban landscapes, ornaments, transits and the orders established in the cities. In the cities of Valdivia in Chile, was obtained as results that the important zone within the mentioned cities, have different degree of visual contaminations, because the commercial zones, is the zones more affected with the visual contaminations, taking in account advertising that they are excessive added the old and new cable that fill and they go dirtying the verticality of the cities [3]. A previous project [4] took into account the studies of light pollution and energy efficiency in outdoor lighting, showing how light pollution causes constant negative impacts not only by emissions to the atmosphere of artificial lights and their subsequent diffusions through the molecule and particle suspensions of the atmospheres, but also by illuminations or over illuminations of surface, object or subject.

Another previous investigation [5] tried to advance and is developing in the city brings as a consequence alteration in the atmosphere, such the disappearances of the dark skies, it is motivating to be able to realize of this works. The purpose is to try to improve the quality of environmental lighting to reduce the negative effects that light pollution produces in the environment. Analyzing the consequences and problems that can arise from causes of light pollution we are determining that avoiding them will not mean "to be all in darkness" rather, to illuminate properly by going to the lights where there is need is necessary: the soil. Visual pollution consists in the vision of certain places, or go the opposite of the aesthetics of some landscapes, causing problems that may affect the health of those who can live in this place. In addition contaminations have references to that billboard and billboard, where they have to be depending on their sizes and excesses is

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becoming a problem. Our concern is the visual pollution that is affecting these urbanized areas, that is, the built environments that accommodate their largest populations in Latin America (85.28%) and around the world (61.25%), according to some data from the United Nations [6]. There are clear demonstrated cases of environmental education, in which citizens organize themselves with the aim of reducing the ecological impact caused by their actions [7], a fact that can be learned from school age through different methodologies [8], [9], [10], [11].

## 2 THEORETICAL FRAMEWORK

As a theoretical basis we can emphasize that light pollution is represented by the brightness of the night sky produced by excessive lighting in cities [12]. In other words, we send light upwards (the sky) when it is required on the ground, where its use is really justified. The excess of advertising media is the main agent of distortions and visual and environmental pollution in urban ecosystems [12]. Some advertising excesses have several contaminating elements of the visual fields; currently the advertising media in the city disturb all the senses, so when we speak of visual contaminations may not reflect the true dimensions of the problems. In the advertising posters in which they immediately impact consumers, there is an increase in the number of people affected by the wall or facade of the infrastructure, destroyed or hidden by the locations of luminous sights [13], [14]. In 2007, World Health Organization's International Agency for Research on Cancer detected that shift work involves circadian disruption, and it was in the list of probable cause of cancer [15]. On top of that, several recent studies have demonstrated positive correlation between night shift work and incidence on breast and prostate cancer [16], [17], [18], [19], [20], [21]. The idea is to solve it, trying to be able to make less use of artificial energy to avoid the warming of ozone that does not affect the visual part of the citizens that we have become very dependent and that is used at certain times that are necessary. Certain people who are affected throughout their lives and have repercussions on their health, for them industrial companies and others should try to make less use of these posters or advertisements.



**Fig. 1.** Picture of Lima, Peru, full of light pollution.

deteriorate the habitat of nocturnal animals and others with migratory patterns, in a few years we will have taken away from our own children the sight of a starry sky as can be seen today only in some places.

## 3 PROBLEM, OBJECTIVE AND JUSTIFICATION OF THE RESEARCH

**First of all, the following research problem raised:**

How is light pollution perceived by the population of Lima,

2019?

**The general objective was:**

To describe how light pollution is perceived by the population of Lima, 2019. For the justification of the research, it was characterized by theoretical, practical and methodological justification. Its theoretical justification was that it will contribute to the knowledge related to light pollution, which, if a quick review is made in indexed publications, it will be possible to see that there is little developed content in South America, it is hoped that the results of this research will be able to synthesize proposals later, to be able to be incorporated having knowledge in the administrative science where the hypothesis is going to be tested. Its practical justification was based on the fact that the research will determine a problematic reality and by means of the findings it will be possible to propose strategies that will contribute to solve problems in similar environments. Finally, it had methodological justification, since the diverse instruments used could be used in other researches in order to extend the contributions of this study.

## 4 METHODOLOGY

The design of this research was non-experimental, cross-sectional and descriptive. It was non-experimental because the researchers will not perform any manipulation on the sample. It was cross-sectional because the collection of information was collected at a given time, without making time series analysis. It is descriptive because there is only one variable, which will be analyzed and described through tables. The populations are sets of everything that agrees with determining certain specifications, the sample was then constituted by the population of Lima, which rises to 9 575 million inhabitants. The researcher used non-probability sampling using the following formula to calculate:

$$n = \frac{N * Z^2 * P * Q}{E^2(N - 1) + Z^2 * P * Q}$$

Because  $N = 8\,575\,000$ ,  $P = 0.5$ ,  $Q = 0.5$ ,  $Z = 1.96$  and  $E = 5\%$ , then  $n = 384$ . Therefore, the sample was for 384 individuals living in Lima. The selection was for convenience, in which the researcher identified the sample in the way that most suited her, this being the points where people met (malls, squares, etc.). The instrument used was the questionnaire and the survey technique. The questionnaire was strategically divided into two parts. The first part will aim to collect general data of the interviewee, such as gender. The second part is related to specific aspects of the research, whose questions were related to the different dimensions of light pollution and its impact on vision. The answer alternatives were distributed on a Likert scale, with 3 levels (low, medium and high knowledge). In order to determine the validity of the survey, an expert judgment was carried out, obtaining the following results:

Expert 1: "the instrument is valid, and will allow the objectives to be achieved".

Expert 2: "the survey is well constituted, well written, and consistent with the variable and dimensions".

Expert 3: "it is valid".

When applying a model survey to 20 individuals, the Cronbach Alpha coefficient was applied, resulting in 0.814. According to the theory, the closer this coefficient is to 1,000, the more

reliable it will be. A result of 0.814 indicates that the instrument is highly reliable. The collected data was tabulated and analyzed using Microsoft Excel programs for statistical analysis. The data were treated with confidentiality, without exposing the individuals in the study. All activities to be carried out in this project will be for research and knowledge dissemination purposes. The sample, which was submitted to a questionnaire, was aware at all times of its implications, filling out the informed knowledge form.

## 5 RESULTS

TABLE 1 shows the level of light pollution in general, while TABLE 2 shows the same information, by gender.

**TABLE 1**

*LEVEL OF KNOWLEDGE, LIGHT POLLUTION*

| Level of knowledge | n   | %    |
|--------------------|-----|------|
| Low knowledge      | 291 | 76%  |
| Medium knowledge   | 76  | 20%  |
| High knowledge     | 17  | 4%   |
| Total answers      | 384 | 100% |

Source: Questionnaire.

Elaboration: The authors

**TABLE 2**

*LEVEL OF KNOWLEDGE BY GENDER, LIGHT POLLUTION*

| Level of knowledge | Male |      | Female |      |
|--------------------|------|------|--------|------|
|                    | n    | %    | n      | %    |
| Low knowledge      | 142  | 84%  | 149    | 69%  |
| Medium knowledge   | 24   | 14%  | 52     | 24%  |
| High knowledge     | 3    | 2%   | 14     | 7%   |
| Total answers      | 169  | 100% | 215    | 100% |

Source: Questionnaire.

Elaboration: The authors

## 6 FINDINGS

Cities with a high content of light pollution are illuminated 24 hours a day, sometimes with spotlights or luminous signs of too many colors that can affect vision because they are too intense. Light pollution does not only the vision of people, but also affect the animals of the place, who find themselves in the need to migrate to other areas, darker where they can perform their daily activities, with greater insecurity for them. This study aimed to measure the level of knowledge of the light pollution, data collected suggested that in general, only 4% of people interviewed have high knowledge of what light pollution is, while 20% had medium knowledge and a high 76% of people interviewed had low knowledge. The data was also segregated by gender, it was found that in general, female people knew more about light pollution than male (high knowledge 7% vs. 2%, for example).

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