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A network model for the short-term prediction of the evolution of cocaine consumption in Spain

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ABSTRACT

Cocaine consumption is a social problem with acute consequences and its dependency can be regarded as a health concern of social transmission. This fact leads us to develop the idea that its transmission dynamics can be studied using epidemiological mathematical models. Under this point of view, in this paper we propose a network model to study the short-term evolution of the cocaine consumer subpopulations. The model parameters are obtained from data source and from an analogue continuous model. Sensitivity of the model parameters is studied. The parameters are associated with prevention and treatment policies and the sensitivity study gives us information about which parameters have more incidence on the future evolution of consumers. Results and discussion are also presented.

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1. Introduction

Cocaine consumption is growing at a worrying rate in developed and developing countries [1,2]. In Spain it is becoming a serious problem not only from an individual health point of view but also from the public socioeconomic one [3,4]. We note that cocaine consumption is increasing (see Table 1).

Thus it is in the interest of public health to study the dynamics of cocaine consumption. In this article, we analyze the evolution of people with habitual cocaine consumption in Spain and simulate some health policy proposals and their effect in reducing this population. Spanish Government strategy on drug abuse appears in the Plan Nacional sobre Drogas (Drugs National Plan) [3,5], issued by the Spanish Health Ministry. The objectives mentioned in this document are:

1. The prevention of drug consumption, pointing out the health concerns produced by their consumption, delaying the age of the first contact with drugs, education programs and legal fight against drugs dealing.
2. To improve quantitative and qualitative research, implement new treatments, evaluate current therapy programs and training to increase professional competence of the people who work with drug abusers.

In this paper, we take cocaine consumption as a socially transmitted epidemic disease. We treat cocaine consumption as a disease that spreads through social peer pressure or social contact. These social contacts have an influence on the probability of transmission of cocaine consumption. The main idea behind this conception is that cocaine consumption can spread

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