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### **CTIS365 - Homework I**

**Title:** A Descriptive Analysis of Loneliness on Health and Socioeconomic Well-being

#### **Abstract**

Loneliness has become the most important public health issue of our time. It is no longer seen as just a personal or emotional problem but as a serious factor that can affect both physical and mental health. Several international studies show that people who experience loneliness for long periods of time are more likely to suffer from depression, anxiety, stress, heart disease, and sleep problems. Research from the US Surgeon General and the World Health Organization (WHO) has also shown that the health risks of a lack of social connections can be as dangerous as smoking or obesity.

In recent years, this problem has rapidly grown so much that now experts have started to call it a “loneliness epidemic.” Between countries such as the US, UK, Japan, and many parts of Europe, the number of people reporting feeling lonely has increased. The main reasons consist of modern lifestyles, digital communication replacing face-to-face contact, aging populations, and changing family structures. These social and technological changes have made it harder for people to create strong and supportive relationships and have also deepened socioeconomic inequalities such as job insecurity and income stress.

Our project aims to study the relationship between loneliness, health, and socioeconomic well-being using large national and international datasets. The goal is to understand how different levels of loneliness are linked to negative health consequences and how these outcomes change between different age groups, genders, ethnics, and income levels. Using a method called Inverse Probability Weighting (IPW), the analysis will not only show the relation but also provide more informed evidence, which means that it will help estimate how much loneliness, separate from other factors, affects people’s physical and mental health.

The most critical part of our project will be the creation of intersectional risk heatmaps, which will visually show how loneliness affects different groups in society. For example, one heatmap might show how severe loneliness influences the number of poor health days for young adults compared to older adults. These maps will make it easier to identify which populations are more at risk and where efforts to promote health should be targeted.

The results of this analysis will be presented in clear tables, visuals, and summaries that are easy to understand for policy makers, health professionals, and community organizations. By turning complex data into simple and meaningful information, our project will help people in decision-making roles to take targeted and fair actions to reduce loneliness and its negative health effects and to improve both overall health and socioeconomic well-being.

**Keywords** – loneliness, public health, social connections, well-being, health inequality, social isolation, trust.

## **Planned Work / Methodology Overview**

Our project follows a clear and organized workflow: In Phase I, we searched and determined the research topic with related datasets then searched articles for it. During Phase II, we will clean and analyze the data using R Studio then apply descriptive methods and create initial visualizations to explore our keywords' relationships. Finally, in Phase III, we will validate the findings with the heatmap and will prepare a final report for this work.

To keep our work organized, we followed a simple task-tracking approach. We divided the whole work into small and manageable steps that allow quick adjustments when we need it. Decided to keep track of our progress in a simple gantt chart inside a drive workspace, where each of us can manage whole tasks. We also hold small weekly meetings to review the progress and coordinate our responsibilities so we ensure the project stays in a scheduled and workloaded balance.

## **Sources**

### **a. Datasets**

We use the EU Loneliness Survey (2022) conducted by the Joint Research Center (JRC) of the European Commission. The dataset consists of two complementary samples: EU4 (France, Italy, Poland, Sweden – probability sample) and EU27 (27 EU member states – non-probability online panel, but larger and more diverse). Data collection took place between October and November 2022.

We selected this dataset for its comprehensive coverage, transparent documentation, and ethical reliability. Participation was voluntary and completely anonymous, and respondents could skip sensitive questions. This makes the data reliable for cross-national analysis, as participants gave informed consent and were allowed to leave responses blank or code them as “prefer not to say” (999) or “don’t know” (998).

A unique feature of the EU27 module is an experimental function embedded within the survey. Participants were briefly asked to make a decision that could affect themselves and others using hypothetical "survey points", which reflect cooperation and social trust.

Only 1 out of every 25 participants was randomly selected to receive bonus points, making this an incentive-consistent setup. Importantly, the experimental nature of the task was disclosed to participants at the end of the survey to maintain ethical transparency.

This dataset combines indicators on loneliness, health, social relationships, trust, digital use and socioeconomic background, making it ideal for intersectional and comparative analyses. Measures of loneliness (UCLA-3 and De Jong Gierveld-6) will be used as key variables along with health and well-being indicators.

## **b. Literature Basis**

### **1. Social Connections and Loneliness in OECD Countries**

This large-scale report examines the intrinsic and policy-relevant importance of social connections, defining concepts like loneliness and social isolation. Its purpose is to quantify the impacts of disconnection across multiple policy domains in OECD countries. Key findings confirm that social connections are crucial for broader well-being, job satisfaction, creativity, and positive financial/labor market outcomes.

The report emphasizes the need for comprehensive measurement encompassing structure, function, and quality of social connectedness to obtain a complete picture. This analysis is foundational, justifying the descriptive study by detailing the broad importance and multi-dimensional nature of social connection.

### **2. Social Isolation and Loneliness Among Older People: Advocacy Brief**

This WHO document concentrates on the public health implications of social isolation and loneliness, focusing heavily on older adults. The main purpose is to advocate for prioritized research and policy interventions, especially given the limited data on costs and cost-effectiveness of interventions. A key finding involves the urgent need for translating high-quality evidence into accessible formats like policy briefs and guidelines for decision-makers. The document supports the overall research theme by establishing loneliness as a critical public health issue among vulnerable populations, emphasizing that evidence synthesis is vital for developing scalable, effective health strategies.

### **3. From Loneliness to Social Connection: Charting a Path to Healthier Societies**

This major report from the WHO Commission on Social Cohesion aims to summarize the global scale, drivers and serious impacts of social isolation and loneliness, positioning social health as a key pillar of overall well-being. The report relies on background papers providing global estimates of the prevalence and mortality due to loneliness. A key finding is that social disconnection is a global crisis that requires multi-sectoral policy responses, driven by factors such as digital technology and cultural context. This descriptive analysis confirms that loneliness is a broad, quantifiable health determinant, increasing the risk of mortality and requiring integrated health and community solutions.

#### **4. A Short Scale for Measuring Loneliness in Large Surveys: Results From Two Population-Based Studies**

The main topic is the development and validation of a short, reliable scale for measuring loneliness specifically designed for use in large population-based surveys. The purpose was to provide researchers with a feasible instrument to measure loneliness (which represents subjective perceived isolation) in studies like the Health and Retirement Study. The key finding, though not explicitly detailed in the provided excerpt, is implied to be the successful creation of a short scale (3-item UCLA scale is mentioned elsewhere as a short scale developed by Hughes et al.) for use where longer measures are impractical.

This tool is crucial for the overall theme, as accurate, scalable measurement is prerequisite for any descriptive analysis of loneliness on health.

#### **5. Between the Lines: Investigating Health Beliefs and Emotional Expressions in Online Mental Health Communities**

This article focuses on creating a methodology using natural language processing (NLP) and machine learning (specifically DistilBERT) to analyze health beliefs and emotional expressions in online mental health communities, specifically in relation to anxiety and loneliness. It aims to classify components of the Health Belief Model (HBM) to gain insight into mental health risks and barriers to help-seeking. A key finding shows that DistilBERT achieved high accuracy for root cause (86%) and self-efficacy (89%) classification, demonstrating the feasibility of the computational approach. This research contributes to descriptive analysis by leading scalable methods to qualitatively understand how loneliness affects individuals' self-perceptions and help-seeking behaviors.

#### **6. OSR Systemic Review Loneliness Statistics**

This systemic review addresses the need for consistent, high-quality statistics on loneliness. Its purpose is to guide government bodies and charitable organizations on increasing the public value of existing loneliness statistics and addressing data gaps. The key finding is that users perceive official statistics as more trustworthy and reliable for developing national policies. Crucially, users often rely on alternative sources like the UK-wide longitudinal household survey *Understanding Society* to overcome the lack of UK comparability in national headline measures. This connects directly to the research theme by establishing the importance of reliable descriptive data for evidence-based policy development and targeted health interventions.

#### **7. Our Epidemic of Loneliness and Isolation**

This advisory focuses on the public health epidemic of loneliness and social isolation. The purpose is to highlight that insufficient connection harms health and to urge investment in relationships as a source of healing ("Connect2Heal"). A key finding indicates that loneliness is pervasive, with almost half of Americans reporting three or fewer close friends. The text stresses that loneliness is a subjective feeling arising from a deficit in needed connection, making it a critical, yet under-recognized, public health challenge. This source frames the descriptive analysis by establishing loneliness as an urgent, large-scale health determinant requiring immediate societal focus and investment.

## **8. Shifting the Paradigm of Social Withdrawal: A New Era of Coexisting Pathological and Non-Pathological Hikikomori**

A key theme is the reappraisal of hikikomori, or pathological social withdrawal, recognizing a new era where pathological and non-pathological forms coexist. It is intended to provide an international context for this syndrome, noting its formal inclusion in the DSM-5-TR. A key finding shows the association of hikikomori with other psychiatric conditions such as major depressive disorder and autism spectrum disorder. The study's focus on defining and characterizing severe, long-term social isolation makes a significant contribution to descriptive analysis by expanding the scope of “loneliness” to a recognized, specific mental/social health syndrome.

## **9. Social Isolation, Loneliness and Their Relationships with Depressive Symptoms: A Population-Based Study**

This population-based study investigates the precise relationships between objective social isolation, subjective loneliness, and depressive symptoms in Singapore adults. The purpose is to rigorously assess how different aspects of social deficits predict mental health outcomes. Key findings show that loneliness, perceived social isolation, and living arrangements are significantly linked to depressive symptoms and may be risk factors for non-mental chronic conditions. This study supports the descriptive analysis by empirically separating and linking the constructs of objective isolation (social networks) and subjective loneliness (feelings) to measurable depressive morbidity.

## **10. Tackling Loneliness Evidence Review**

This report critically reviewed the literature on loneliness, using a life-span perspective, primarily for UK policymakers and non-specialists, aiming to identify and prioritize gaps in the evidence base. A key finding is that there is an exhaustive link confirmed between loneliness and poorer physical health in adulthood. The report highlights major evidence gaps related to environmental factors, connectivity (transit access, mobile networks), and the built environment (e.g., libraries, recreational facilities). The review directly informs the descriptive analysis by prioritizing crucial, under-researched environmental determinants of loneliness and associated health problems.

## **11. The Impact of Loneliness on Depression, Mental Health, and Physical Well-Being**

This research aims to evaluate the causal effect of loneliness on serious health morbidities using advanced statistical methods and a nationally representative American sample. The purpose is to provide highly rigorous quantitative evidence demonstrating that loneliness is a strong independent predictor of depression, poor mental health days, and poor physical health days. A key finding (derived from the context of the study's focus, as specific numbers are found in supplementary tables) confirms that loneliness is a critical and substantial predictor of these adverse health outcomes, requiring strong policy implications. This source strengthens descriptive analysis by providing highly rigorous causal evidence that directly links loneliness to measurable declines in physical and mental health.

## Conclusion

Unlike other projects, this project not only gives a detailed research analysis on solely loneliness correlations, but also provides a scale by developing risk heatmaps that visually depict how loneliness interacts with multiple demographic and health variables. We aim to use these R-based heatmap visualizations as a scale in different industries.

We will give the predicted probability of depression and the average number of poor health days across different levels of loneliness by using large segments like age, gender, ethnicity, childhood, and so forth. This visualization will reveal which specific subgroups, such as young non-white women or older white men, bear the greatest burden of loneliness.

By developing a new **Loneliness Burden Scale** based on existing survey variables, our analysis offers a unique, data-driven perspective on vulnerability with adding new visualization and scaling methods, our effort expands on this analytical basis and improves the research.

Finally, this strategy will provide policymakers and community organizations with actionable evidence that highlights areas where targeted assistance is urgently needed. In Phase II, we will validate these findings using regression and R-based visualization.

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