



Consequences of Night Shift Work for Women in the Pune Region

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Abstract:

This study investigates the health consequences faced by women working night shifts, with a focus on understanding the effects on various physical and mental health aspects. Data was collected from women of varying ages, covering factors such as working hours, digestive issues, eye health, menstrual cycle, cardiovascular health, hair and skin health, along with specific concerns like migraines, muscle pain, memory issues, breast cancer risk, Gastrointestinal cancer and miscarriage. Logistic regression analysis revealed a significant correlation between working overtime and menstrual cycle irregularities, while chi-square tests showed dependencies between digestive issues and both skin health and working hours. In conclusion, our analysis reveals a significant interlink between overtime work, skin problems, and digestive issues. Specifically, it was found that 70% of women experience menstrual cycle problems when working 8.5 hours or more per day. Based on these findings, practical guidelines were developed and shared with respondents to help mitigate health risks associated with night shift work, offering insights into better self-care and prevention strategies. The results emphasize the importance of workplace health interventions for women in night shifts.

Keywords: Night shift, Stress, Health Care, Cancer, Overtime.

Introduction:

In the modern workforce, the rise of women taking on night shift jobs has significantly transformed traditional work structures, particularly in countries like India. While these changes signify progress in gender equality and economic participation, India's workforce comprises a growing number of women engaged in night shifts, particularly in sectors like IT services, healthcare, and manufacturing. These industries rely heavily on shift work to meet international schedules and consumer demand[1]. For example, the healthcare sector requires 24/7 staffing, often placing nurses and medical professionals in demanding night roles. Despite their contributions, these women often operate in environments that do not fully address their

unique needs, such as access to safe transportation, ergonomic support, and health-focused workplace policies (2).

Moreover, India's traditional societal roles often place additional stress on women, who balance professional and domestic responsibilities. This dual burden amplifies health risks, as irregular work. Our Research also aligns with the vision of Nari Shakti (women's power), a cornerstone of India's socio-economic development narrative. The *Nari Shakti* vision emphasizes not just the inclusion of women in the workforce but also their holistic empowerment. This includes ensuring their safety, health, and well-being.

Our study contributes to this vision by identifying health risks specific to Indian women working night shifts and offers them

practical guidance on how they can be in their best of health (3). By focusing on their well-being, this research aims to enable women to pursue their careers without compromising their health, thus contributing to a stronger, more resilient workforce (4).

Women have become integral contributors across industries such as healthcare, information technology, manufacturing, and telecommunications, often working during unconventional hours to meet global demands. Also introduce unique challenges that can have profound implications on women's health.

In 2019, The International Agency for Research on Cancer (IARC) classified night shift work as probably carcinogenic (5). According to Hindustan Times One study says that long-term night shift work among women increased the risk of cancer by 19%. When analyzing specific cancers, the researchers found that this population had an increased risk of skin (41%), breast (32%), and gastrointestinal cancer (18%) compared with women who did not perform long-term night shift work (6).

The major physical health disturbances seen by night shift working women are overweight and obesity, diabetes and hypertension. The Gastro-Intestinal Tract (GIT) problems is one of the major rising health issues.

A study conducted among night shift working women in different BPOs, hospitals, garments, leather, and textile industries in nine different cities of India reported that 45% of the population had continuous tiredness, 55% suffered from clinical cold and cough frequently, 45% had respiratory illness and 45% were generally ill frequently (7). A study on night shift working women in India reported that Night shift work was found to be associated with a statistically significant higher incidence of miscarriage in women who worked during their first trimester. When the study was limited to first pregnancies, night working

women were shown to have a considerably higher risk (8).

Objective of Research:

Our Research Aim to identify and analyze these health consequences through rigorous data collection and analysis but also aims to provide practical guidance on how women can take better care of their health while working night shifts

Methods:

Our research survey was conducted using Google Forms, which allowed us to efficiently collect and organize data from respondents in a structured format. The survey received an encouraging response, with a total of 102 women participating. The participants were based in Pune, a city recognized for its diverse workforce and dynamic industrial landscape. This setting provided a rich context for analyzing the effects of night shifts across various professional sectors.

The respondents represented a broad spectrum of industries, showcasing the multifaceted nature of night shift work. They included professionals from fields such as law enforcement (police), information technology (IT), healthcare, finance, journalism, and business. Additionally, students and interns who engage in part-time night shifts also participated, further diversifying the sample. This variety in sectors ensured that the survey captured a wide array of experiences and health implications, reflecting the collective challenges faced by women working during unconventional hours.

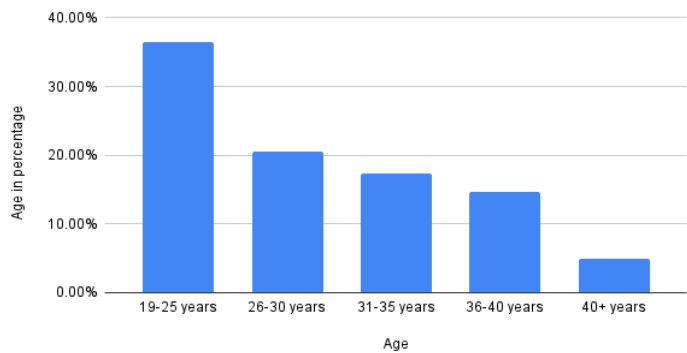
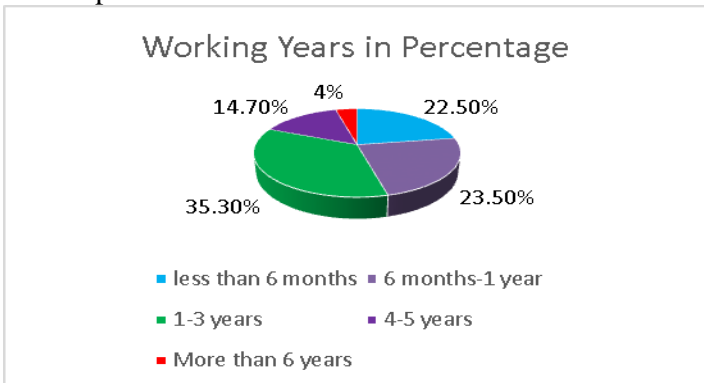
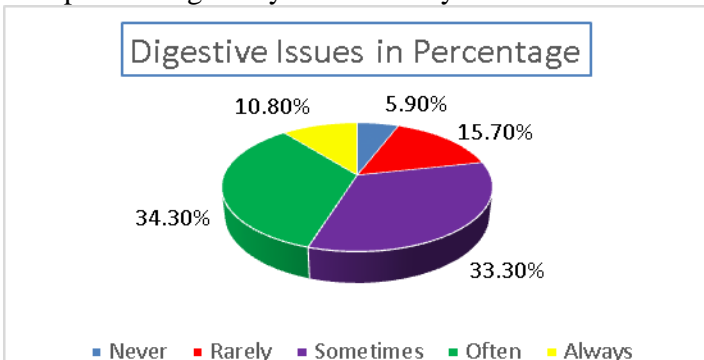
Scope of the Study:

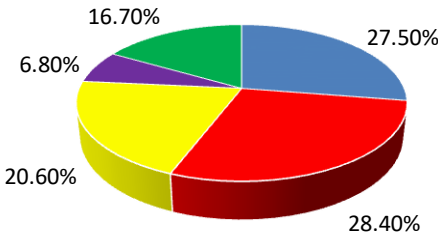
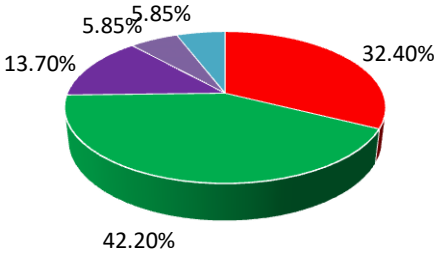
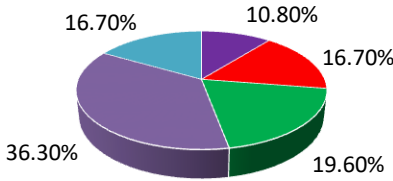
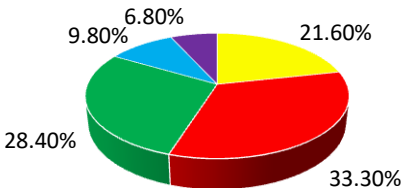
Our survey encompassed critical health parameters, including age, working hours, digestive issues, eye health, menstrual cycle irregularities, cardiovascular health, hair and skin health, and other concerns like migraines, muscle pain, memory issues,

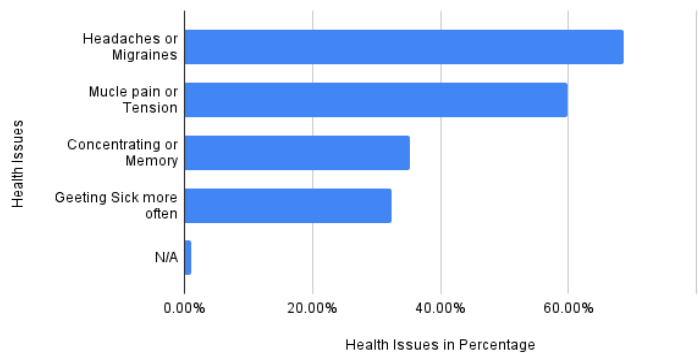
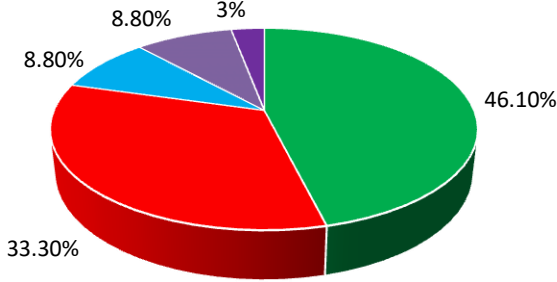
breast cancer risk, and miscarriages. The breadth of these parameters was designed to

offer a comprehensive view of the impact of night shift work on women's overall health.

Table No. 1: Data Visualization Based on the Questionnaire

| Sr. No | Question | Data Type | Intention/ Graph | | | | | | | | | | | | |
|--------------------|---|-----------|---|----------------|------------|--------------------|--------|-----------------|--------|-------------|--------|-------------|--------|-------------------|--------|
| 1 | What is Your Age? | Discrete | <p>Age is a crucial demographic factor that influences the body's ability to adapt to irregular schedules, such as night shifts.</p> <p>Also Extend Our research paper to all type of Age and not restricting to a certain age.</p>  <table><caption>Age in percentage</caption><thead><tr><th>Age</th><th>Percentage</th></tr></thead><tbody><tr><td>19-25 years</td><td>36.00%</td></tr><tr><td>26-30 years</td><td>20.00%</td></tr><tr><td>31-35 years</td><td>18.00%</td></tr><tr><td>36-40 years</td><td>15.00%</td></tr><tr><td>40+ years</td><td>5.00%</td></tr></tbody></table> | Age | Percentage | 19-25 years | 36.00% | 26-30 years | 20.00% | 31-35 years | 18.00% | 36-40 years | 15.00% | 40+ years | 5.00% |
| Age | Percentage | | | | | | | | | | | | | | |
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| 36-40 years | 15.00% | | | | | | | | | | | | | | |
| 40+ years | 5.00% | | | | | | | | | | | | | | |
| 2 | How long you have been working in Night Shifts? | Discrete | <p>Working period is very important to Know because It is shows variation in that how nights shifts can affect health. Longer period can show major and different effects than shorter period.</p>  <table><caption>Working Years in Percentage</caption><thead><tr><th>Working Period</th><th>Percentage</th></tr></thead><tbody><tr><td>less than 6 months</td><td>4%</td></tr><tr><td>6 months-1 year</td><td>22.50%</td></tr><tr><td>1-3 years</td><td>35.30%</td></tr><tr><td>4-5 years</td><td>23.50%</td></tr><tr><td>More than 6 years</td><td>14.70%</td></tr></tbody></table> | Working Period | Percentage | less than 6 months | 4% | 6 months-1 year | 22.50% | 1-3 years | 35.30% | 4-5 years | 23.50% | More than 6 years | 14.70% |
| Working Period | Percentage | | | | | | | | | | | | | | |
| less than 6 months | 4% | | | | | | | | | | | | | | |
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| 4-5 years | 23.50% | | | | | | | | | | | | | | |
| More than 6 years | 14.70% | | | | | | | | | | | | | | |
| 3 | How often do you experience digestive issues? | Ordinal | <p>Studying digestive issues in women working night shifts is crucial because it highlights the health risks associated with disrupted biological cycle and lifestyle factors.</p>  <table><caption>Digestive Issues in Percentage</caption><thead><tr><th>Frequency</th><th>Percentage</th></tr></thead><tbody><tr><td>Never</td><td>5.90%</td></tr><tr><td>Rarely</td><td>15.70%</td></tr><tr><td>Sometimes</td><td>33.30%</td></tr><tr><td>Often</td><td>34.30%</td></tr><tr><td>Always</td><td>10.80%</td></tr></tbody></table> | Frequency | Percentage | Never | 5.90% | Rarely | 15.70% | Sometimes | 33.30% | Often | 34.30% | Always | 10.80% |
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| Often | 34.30% | | | | | | | | | | | | | | |
| Always | 10.80% | | | | | | | | | | | | | | |

| 4 | Have you noticed any changes in your cardiovascular health? | Ordinal | <p>Studying cardiovascular health among women is essential as it identify the specific risks cause by stress and unhealthy lifestyle due to night shifts.</p> <div><p>Cardiovascular Health</p><table><thead><tr><th>Category</th><th>Percentage</th></tr></thead><tbody><tr><td>Blue</td><td>27.50%</td></tr><tr><td>Red</td><td>28.40%</td></tr><tr><td>Yellow</td><td>20.60%</td></tr><tr><td>Purple</td><td>6.80%</td></tr><tr><td>Green</td><td>16.70%</td></tr></tbody></table></div> | Category | Percentage | Blue | 27.50% | Red | 28.40% | Yellow | 20.60% | Purple | 6.80% | Green | 16.70% |
|----------|---|---------|--|----------|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Category | Percentage | | | | | | | | | | | | | | |
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| Yellow | 20.60% | | | | | | | | | | | | | | |
| Purple | 6.80% | | | | | | | | | | | | | | |
| Green | 16.70% | | | | | | | | | | | | | | |
| 5 | Have you experienced changes in your menstrual cycle since starting night shifts? | Nominal | <p>Menstrual cycle is one of the important and sensitive topic that need to study as any change in circadian rhythms of body and increase in stress , disrupted sleep can directly affect menstrual cycle.</p> <div><p>Menstrual Cycle Problems</p><table><thead><tr><th>Category</th><th>Percentage</th></tr></thead><tbody><tr><td>Red</td><td>32.40%</td></tr><tr><td>Green</td><td>42.20%</td></tr><tr><td>Purple</td><td>13.70%</td></tr><tr><td>Blue</td><td>5.85%</td></tr></tbody></table></div> | Category | Percentage | Red | 32.40% | Green | 42.20% | Purple | 13.70% | Blue | 5.85% | | |
| Category | Percentage | | | | | | | | | | | | | | |
| Red | 32.40% | | | | | | | | | | | | | | |
| Green | 42.20% | | | | | | | | | | | | | | |
| Purple | 13.70% | | | | | | | | | | | | | | |
| Blue | 5.85% | | | | | | | | | | | | | | |
| 6 | Have you experience Eye's related problems? | Ordinal | <p>To study the eye related issues caused by artificial lighting, screen exposure for extended period of time,lack of sleep.</p> <div><p>Eye's Related Problems in Percentage</p><table><thead><tr><th>Category</th><th>Percentage</th></tr></thead><tbody><tr><td>Red</td><td>16.70%</td></tr><tr><td>Purple</td><td>10.80%</td></tr><tr><td>Green</td><td>16.70%</td></tr><tr><td>Blue</td><td>19.60%</td></tr><tr><td>Yellow</td><td>36.30%</td></tr></tbody></table><p>■ Never ■ Rarely ■ Sometimes ■ Often ■ Always</p></div> | Category | Percentage | Red | 16.70% | Purple | 10.80% | Green | 16.70% | Blue | 19.60% | Yellow | 36.30% |
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| Blue | 19.60% | | | | | | | | | | | | | | |
| Yellow | 36.30% | | | | | | | | | | | | | | |
| 7 | Have you noticed any changes in your skin health? | Nominal | <p>To Understand the impact of night shifts on skin health of women's.</p> <div><p>Changes in skin Health</p><table><thead><tr><th>Category</th><th>Percentage</th></tr></thead><tbody><tr><td>Yellow</td><td>21.60%</td></tr><tr><td>Red</td><td>33.30%</td></tr><tr><td>Green</td><td>28.40%</td></tr><tr><td>Blue</td><td>9.80%</td></tr><tr><td>Purple</td><td>6.80%</td></tr></tbody></table></div> | Category | Percentage | Yellow | 21.60% | Red | 33.30% | Green | 28.40% | Blue | 9.80% | Purple | 6.80% |
| Category | Percentage | | | | | | | | | | | | | | |
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| Red | 33.30% | | | | | | | | | | | | | | |
| Green | 28.40% | | | | | | | | | | | | | | |
| Blue | 9.80% | | | | | | | | | | | | | | |
| Purple | 6.80% | | | | | | | | | | | | | | |

| 8 | Have you experience any following Health issues? | Nominal | <p>To study different health issues apart from mentioned in questions that women's face due to nights shifts.</p> <p>Other Health Issues</p>  <table><caption>Health Issues in Percentage</caption><thead><tr><th>Health Issues</th><th>Percentage</th></tr></thead><tbody><tr><td>Headaches or Migraines</td><td>68.00%</td></tr><tr><td>Mucle pain or Tension</td><td>60.00%</td></tr><tr><td>Concentrating or Memory</td><td>35.00%</td></tr><tr><td>Geeting Sick more often</td><td>32.00%</td></tr><tr><td>N/A</td><td>2.00%</td></tr></tbody></table> | Health Issues | Percentage | Headaches or Migraines | 68.00% | Mucle pain or Tension | 60.00% | Concentrating or Memory | 35.00% | Geeting Sick more often | 32.00% | N/A | 2.00% |
|-------------------------|---|---------|---|------------------|------------|------------------------|--------|-----------------------|--------|-------------------------|--------|-------------------------|--------|--------|-------|
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| N/A | 2.00% | | | | | | | | | | | | | | |
| 9 | Have you developed any coping mechanisms that might impact your health? | Nominal | <p>To understand is there any hype in consuming different coping mechanism among women's while working in night shifts.</p> <p>coping mechanism in percentage</p>  <table><caption>Coping Mechanism in Percentage</caption><thead><tr><th>Coping Mechanism</th><th>Percentage</th></tr></thead><tbody><tr><td>Green</td><td>46.10%</td></tr><tr><td>Red</td><td>33.30%</td></tr><tr><td>Blue</td><td>8.80%</td></tr><tr><td>Yellow</td><td>8.80%</td></tr><tr><td>Purple</td><td>3%</td></tr></tbody></table> | Coping Mechanism | Percentage | Green | 46.10% | Red | 33.30% | Blue | 8.80% | Yellow | 8.80% | Purple | 3% |
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| Green | 46.10% | | | | | | | | | | | | | | |
| Red | 33.30% | | | | | | | | | | | | | | |
| Blue | 8.80% | | | | | | | | | | | | | | |
| Yellow | 8.80% | | | | | | | | | | | | | | |
| Purple | 3% | | | | | | | | | | | | | | |

Statistical Analysis

To provide a robust analytical foundation, our study employed two primary statistical methods:

1. Logistic Regression: This analysis examined the relationship between overtime work and menstrual cycle irregularities, yielding statistically significant results that validated our hypothesis.

2. Chi-Square Tests: These tests explored dependencies among other health variables. Two notable findings emerged:

- A significant dependence between digestive issues and skin health.
- A strong association between extended working hours and digestive issues.

These results underline the interconnected nature of health consequences arising from night shift work

and highlight areas for focused interventions.

Guidelines:

Beyond data analysis, our research aimed to be proactive in addressing the identified health risks. We developed and disseminated practical guidelines to all survey respondents, offering evidence-based tips to mitigate health risks while working night shifts. These recommendations included maintaining a balanced diet, optimizing sleep schedules, regular physical activity, and managing stress effectively.

Analysis:**Logistic Regression:****Logistic Regression on working Hours and Changes in Menstrual Cycle:**

Logistic regression was chosen to determine the relationship between working overtime and menstrual cycle irregularities. This test is particularly significant as it quantifies the likelihood of experiencing

menstrual health issues due to extended work hours. By identifying this relationship, the analysis highlights how lifestyle factors linked to night shifts disrupt hormonal balance and reproductive health. The results help emphasize the need for interventions tailored to managing work schedules to reduce such risks.

Logistic Regression Equation

$$P(y = 1|x) = \frac{1}{1 + e^{-(\beta_1 x + \beta_0)}}$$

| Co-efficient of regression | Intercept |
|----------------------------|-------------|
| β_1 | β_0 |
| 0.44856858 | -2.95440481 |

$$P(y=1 | x=8.5)=0.70 \text{ (70\%)}$$

So, $y=1$ when $x=8.5$ hrs

Hence, we conclude that 70% women's have menstrual cycle problem when they working more than or equal to 8.5 hours.

Chi-Test Square for Independence:**Chi-Square Test 1: Digestive Issues and Skin Health:**

The chi-square test was used to examine the dependency between digestive issues and skin health. These two factors are interconnected, as poor digestion can affect nutrient absorption, leading to skin-related

Observed Values -

| Observed Values | | Digestive Issues | | Total |
|-----------------|-----|------------------|-----|-------|
| | | No | Yes | |
| Skin Issues | No | 1 | 5 | 6 |
| | Yes | 21 | 75 | 96 |
| Total | | 22 | 80 | 102 |

We Conclude that Digestive Issues and Skin Problems are **Dependent** to each other

Chi-Test Square for Independence:**Chi-Square Test 2: Working Hours and Digestive Issues:**

This chi-square test assessed the relationship between long working hours and the prevalence of digestive issues. Prolonged working hours, especially during

problems like acne or dullness. This test is significant because it identifies how internal health directly impacts external health, enabling the formulation of dietary and lifestyle recommendations that address both concerns holistically.

Hypothesis -

H_0 = Digestive Issues and Skin problems are **Independent** to each other.

H_1 = Digestive Issues and Skin Problems are **dependent** to each other.

the night, disrupt eating schedules and the body's natural digestive processes. Understanding this dependency is crucial for creating strategies to improve dietary habits, meal timing, and stress management among women working night shifts, ultimately reducing the risk of chronic gastrointestinal problems.

Hypothesis -

Ho = Working overtime and Digestive Issues are Independent to each other.

H1 = Working overtime and Digestive Issues are Dependent to each other

Observed Values

| Observed Values | | Digestive Issues | | Total |
|-----------------|-----|------------------|-----|-------|
| | | No | Yes | |
| Working Hours | No | 2 | 17 | 19 |
| | Yes | 5 | 78 | 83 |
| Total | | 7 | 95 | 102 |

We Conclude that Working overtime and Digestive Issues are **Dependent** to each other.

Conclusion:

Our research highlights the significant health consequences of night shift work on women, focusing on issues such as menstrual cycle, digestive problems, cardiovascular health, skin and hair health eye health and overall well-being. Through rigorous data collection and statistical analysis, we identified critical dependencies, such as the relationship between working hours and menstrual health, digestive issues, and skin health and working hours and digestive issues. The findings underscore the need for targeted interventions to address these challenges.

The guidelines provided, which include prioritizing sleep, following a healthy diet, staying hydrated, taking work breaks, and engaging in regular exercise etc, are practical steps to mitigate these risks. By aligning with the vision of *Nari Shakti* and promoting workplace policies that prioritize health, this study contributes to empowering women to achieve professional success without compromising their well-being. This research serves as a foundation for future studies and action plans aimed at enhancing the quality of life for women in night shift roles.

References:

1. Lim, S., Ahn, H., Shin, S., Lee, D., & Kim, Y. H. (2024). Investigating

- night shift workers' commuting patterns using passive mobility data. *Transportation research part A: policy and practice*, 181, 104002.
2. Barry, M. M., Kuosmanen, T., Keppler, T., Dowling, K., & Harte, P. (2024). Priority actions for promoting population mental health and wellbeing. *Mental Health & Prevention*, 33, 200312.
3. Gayval, B., & Mhaske, V. (2023). Evaluation of Descriptive Probability Approach, Cosi Pretrained mo. *Journal of Scientific Research*, 67(2).
4. Reavley, N. J., Ross, A., Martin, A., LaMontagne, A. D., & Jorm, A. F. (2014). Development of guidelines for workplace prevention of mental health problems: A Delphi consensus study with Australian professionals and employees. *Mental Health & Prevention*, 2(1-2), 26-34.
5. Yang, W., Lin, L., Zhu, W., & Liang, S. (2015). An introduction to mental health services at universities in China. *Mental Health & Prevention*, 3(1-2), 11-16.
6. Mhaske, V. (2023). ASHA -Bridging Community With Facilities. *International Journal of Creative Research Thoughts*.
7. Grummitt, L., Barrett, E., Halladay, J., Bailey, S., Birrell, L., Hunter, E., ... & Teesson, M. (2023). Embedding action on social and structural determinants of mental health into a national framework: An "immunisation schedule" for the

- prevention of common mental disorders. *Mental Health & Prevention*, 32, 200308.
8. Ray, D., & Subramanian, S. (2022). India's lockdown: An interim report. In *The impact of COVID-19 on India and the global order: A multidisciplinary approach* (pp. 11-61). Singapore: Springer Nature Singapore.
 9. Barthwal, V., Jain, S., Babuta, A., Jamir, C., Sharma, A. K., & Mohan, A. (2022). Health impact assessment of Delhi's outdoor workers exposed to air pollution and extreme weather events: an integrated epidemiology approach. *Environmental Science and Pollution Research*, 29(29), 44746-44758.
 10. Hertenstein, E., Johann, A., Baglioni, C., Spiegelhalder, K., & Riemann, D. (2016). Treatment of insomnia—A preventive strategy for cardiovascular and mental disorders. *Mental Health & Prevention*, 4(2), 96-103.
 11. Mhaske, M. V., & Tarte, M. P. (2024). Unveiling Stress: A Comprehensive Exploration of Women's Experiences in Modern Society.