25 JULY 2024

PILOT FATIGUE & WORK ENVIRONMENT

SAFETY CULTURE SURVEY 2024

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In today's data-driven world, understanding target audiences' perspectives, behaviours, and preferences is crucial for making informed decisions. To this end, we have conducted a comprehensive survey to gather insights into the safety culture of the Indian aviation industry. This safety culture survey report presents a detailed data analysis, offering valuable findings that can guide strategic planning and decision-making processes.

This study explored the mutual influence of fatigue-influencing factors related to the "work" dimension in analysing the causes of pilot fatigue. Collecting responses from diverse participants, we sought to uncover trends, identify critical issues, and gain a deeper understanding of pilot fatigue and management. The insights gained from this survey will highlight current perceptions and behaviours and provide a foundation for future initiatives and improvements.

The survey was designed to capture a wide range of information, encompassing various dimensions such as personal data, work status, work condition, workload and work schedule. Likert chart options have been primarily used to range from little influence to deep influence.

In the following sections, we will present the survey findings in a structured manner, providing detailed analysis and interpretation of the data. We will also discuss the implications of these findings and offer recommendations based on the insights obtained. This report aims to provide a comprehensive overview of the current landscape and suggest actionable steps for moving forward.

We hope the insights presented in this survey report will be valuable to stakeholders and decision-makers, enabling them to make informed choices and drive positive change within their organisations and communities.

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1. ABOUT

Safety Matters Foundation is a non-governmental organisation based in India. The sole objective of 'Safety Matters' is to establish a generative safety culture through collaboration with society and the government. Amongst a series of initiatives to enhance safety, the foundation conducts surveys to gather reliable data and transform it into reports, which are then shared with all stakeholders.

The foundation conducted the first Safety Culture Survey ever in India in 2020. Fatigue was identified as a safety concern. In 2022, the foundation conducted the second Safety Culture survey. The main aim was to determine how much fatigue had affected pilots in India. The result shows that the pilots suffer from severe excessive daytime sleepiness, while many pilots self-assessed moderate daytime sleepiness. Many pilots responded 'yes ' to whether they had fallen asleep without the planning/consent of the other pilot or experienced microsleep episodes.

Having identified fatigue as a significant threat to flight safety and the extent to which pilots in India had been affected, a third and concluding Safety Culture survey was conducted in July 2024 to determine the factors that influence fatigue amongst pilots in India.

2. BACKGROUND

Pilot fatigue remains a critical issue in the aviation industry, impacting safety, performance, and well-being. The demanding nature of flight operations, with irregular schedules, long duty periods, and disrupted sleep patterns, significantly contributes to fatigue among pilots. This fatigue affects cognitive functions and decision-making and increases the risk of errors and accidents. Fatigue risk management for pilots has received increasing attention in recent years. Existing fatigue management systems offer detailed descriptions of the factors and the mutual influences among those factors that affect the "sleep" dimension, one of the primary causes of fatigue. However, analysing factors influencing fatigue's "work" dimension has not been as detailed or accurate, particularly in exploring the mutual influences among numerous fatigue-inducing factors within the work context. By analysing survey results, we can gain valuable insights into the factors contributing to pilot fatigue and identify targeted interventions to enhance aviation safety and operational efficiency.

3. OBJECTIVE

This study explored the mutual influence of fatigue-influencing factors related to the "work" dimension in analysing the causes of pilot fatigue.

4. THE SURVEY

Five hundred thirty respondents marked an online survey form from 16-22 July 2024. The form is divided into seven parts.

1. Nature of flight operations
2. Personal information
3. Effect of working status on fatigue
4. Effect of working conditions on fatigue

5. Effect of workload on fatigue
6. Effect of work schedules on fatigue
7. Details and comments

The answers for sections 3-6 are multiple-choice options varying from slight influence to deep influence.

1. “Slight Influence”:

Definition: A minimal level of impact or effect that is barely noticeable. The influence is present but does not cause significant change or alteration in behaviour or outcomes.

-Example: Minor adjustments or perceptions that do not drastically alter the course of actions or decisions.

2. “Little Influence”:

- Definition: A low level of impact with a more noticeable effect than slight influence but remains relatively minor. It may cause some change or adjustment, but these are typically small and not substantial.

- Example: Small factors that might cause a minor deviation or slight modification in plans or behaviour.

3. “Moderate Influence*”:

-Definition: A moderate impact that causes noticeable and measurable changes or effects. This influence is significant enough to alter behaviours, decisions, or outcomes in a more apparent way.

- Example: Factors that cause visible schedule adjustments, performance, or decisions but do not completely dominate the situation.

4. “Significant Influence”:

- Definition: A high level of impact that leads to considerable changes or effects. This influence is strong enough to alter behaviours, decisions, or outcomes substantially.

- Example: Important factors that play a significant role in shaping actions, decisions, or results, leading to substantial changes.

5. “Deep Influence”:

- Definition: A profound and pervasive level of impact that leads to fundamental changes or effects. This influence is so strong that it profoundly affects behaviours, decisions, or outcomes.

- Example: Critical factors that can drastically change the course of actions or decisions, having a lasting and transformative effect.

5. FINDINGS OF PREVIOUS SAFETY CULTURE SURVEY

The Safety Culture Survey 2020 revealed that fatigue is a concern for all respondents across functional areas, and they expressed the same very strongly. The respondents strongly disagree with whether employers have implemented fatigue management in their organisation. Fatigue is now a global concern, and numerous studies have proven the ill effects of fatigue on safety in the workplace if it is not managed systematically.

The Likert scale shows that respondents agree that compliance with safety requirements is essential in maintaining a good safety culture in the organisation (A9). Workers are aware of the organisation's safety reporting system (C14) and that the safety training imparted to the workers is helpful to the practical working circumstances (D21).

On the other hand, the respondents' key concerns or negative emotions are related to processing safety information and specific events. The respondents feel that enough resources and workforce are not dedicated to safety (G34), and Safety concerns, once raised, are not dealt with promptly and comprehensively by the state (C18). This is further qualified by highlighting the most significant global problem: fatigue, an emerging threat, and risk to flight safety. The respondents feel the employer does not implement fatigue management (G36).

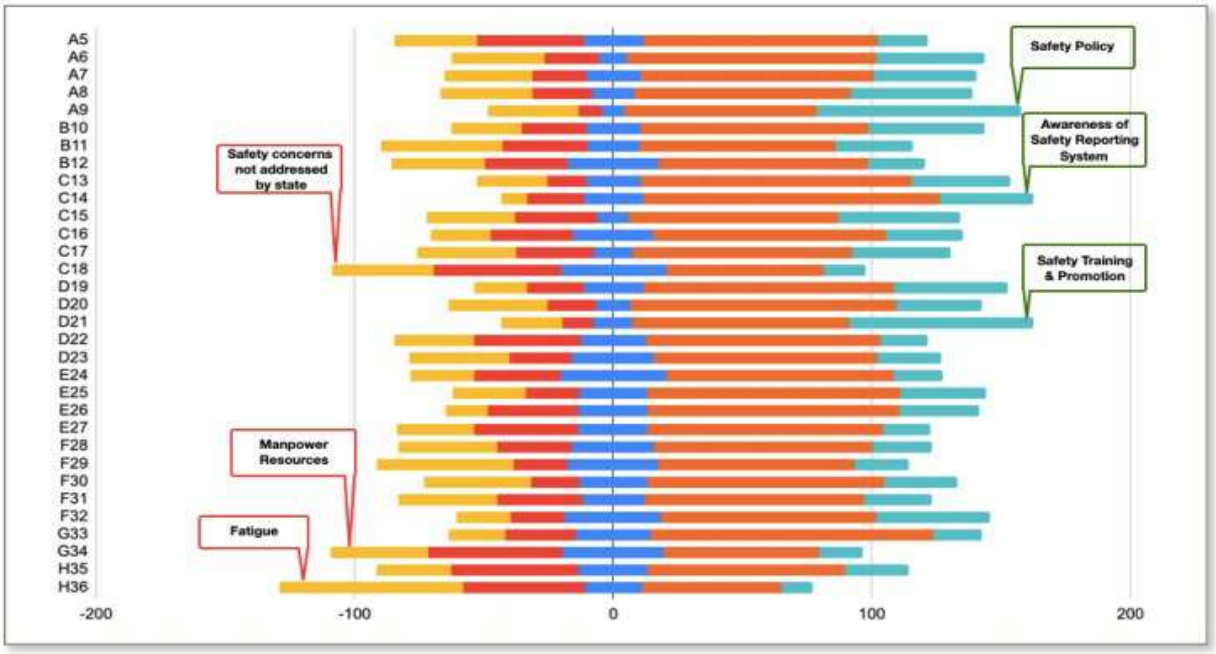

Figure 1: Safety Culture Survey 2020

The key findings of the Safety Culture Survey 2022 on fatigue were as follows.

54.2% of the pilots suffer from severe excessive daytime sleepiness, while 41.4% of pilots self-assessed moderate daytime sleepiness through the questionnaire.

Excessive daytime sleepiness (EDS) is a common feature among shift workers.

66% of pilots responded ‘yes ’to the question if they had fallen asleep without the planning/consent of the other pilot or experienced microsleep episodes.

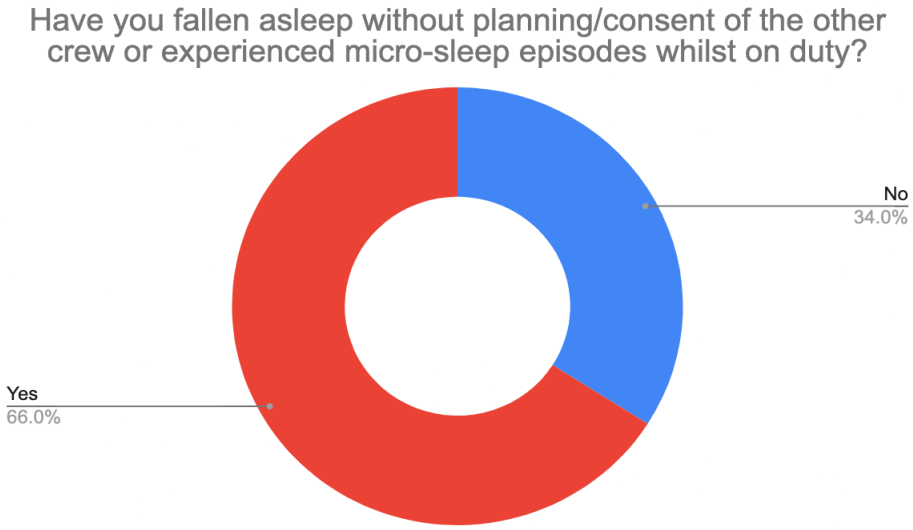

Figure 2: Microsleep

71% of pilots in the survey responded that they often felt so tired that they shouldn’t have been doing cockpit duty.

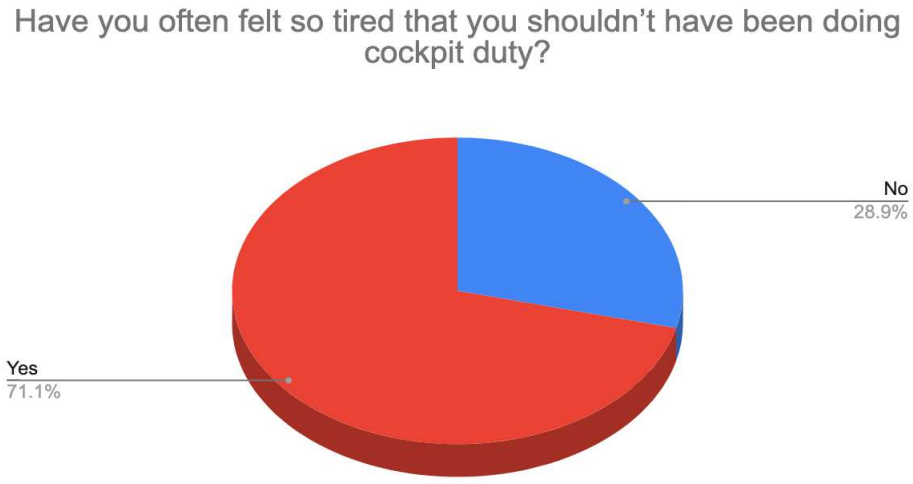

Figure 3: Tired in the cockpit

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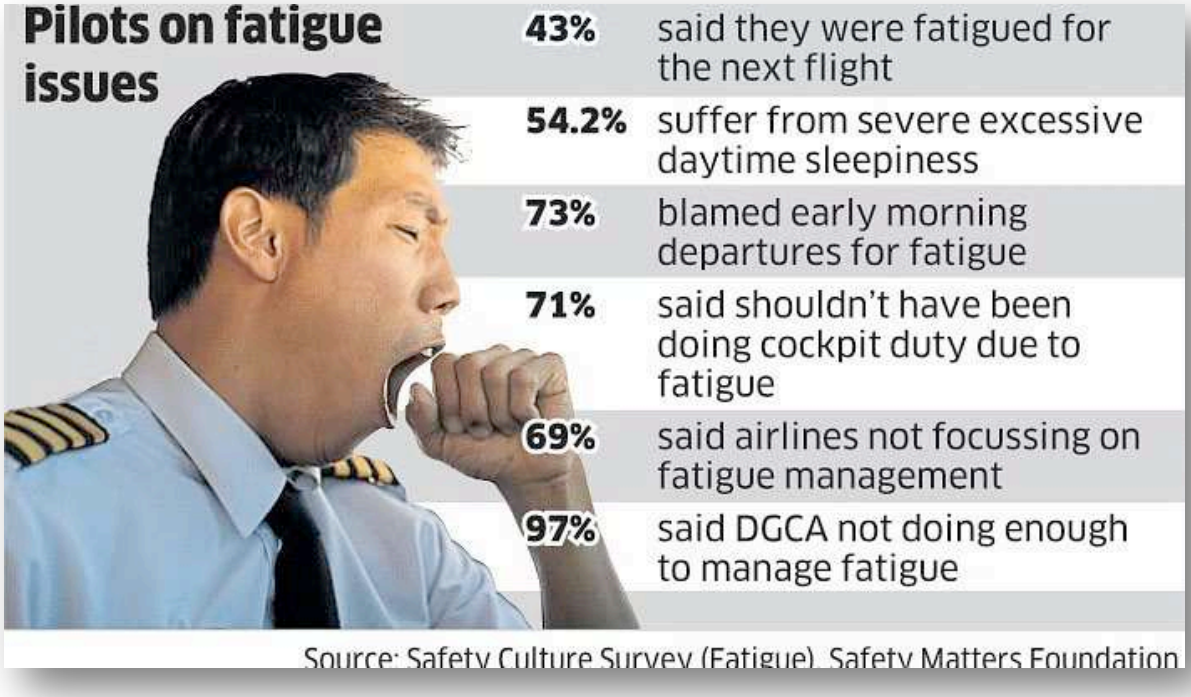

Figure 4: Pilot fatigue survey summary

6. EXECUTIVE SUMMARY

Pilots frequently encounter work characteristics such as lengthy shifts, early morning departures, late arrivals, and irregular working hours. Similar to industrial shift workers, they face numerous fatigue factors. However, pilots also deal with unique stressors specific to the civil aviation industry, particularly within the "work" dimension. This study categorises these stressors into various groups: working status factors like complex weather disturbances, working condition factors such as cramped cockpit spaces, workload factors including physical and mental demands, and working schedule factors like extended flight duties.

In this context, working status factors exclude personal physiological elements such as sleep patterns, circadian rhythms, and overall physical health. Instead, they refer to the pilot's condition post-flight, influenced by environmental disturbances (e.g., air turbulence), sudden technical issues, workplace support, schedule changes, and communication challenges.

Working conditions, distinct from sleep-related environmental factors, focus on the operational environment. Adverse weather, noise, temperature, vibrations, exposure to harmful substances, and inadequate lighting contribute to fatigue when they fail to meet the pilots' physical and psychological needs. Additionally, poorly designed equipment and workstations can cause improper working postures, leading to physical strain and increased fatigue from both physical exertion and psychological pressure. Social conditions, including business pressures, meal quality, and rest conditions during transit, also significantly contribute to pilot fatigue.

Regarding pilot working schedule factors, Goode (Goode J. H. Are pilots at risk of accidents due to fatigue? J Safety Res. 2003)found that the likelihood of a commercial aviation accident increases significantly with longer duty hours, with 20% of US commercial aviation accidents occurring during duties lasting 10 hours or more. Furthermore, staying awake and working for 18.5 to 21 hours can impair performance to a degree comparable to having a blood alcohol concentration of 0.05 to 0.08%. Consequently, this study considers long work hours a critical factor in working schedules.

The number of Indian Pilots declared temporarily medically unfit(TMU) or permanently medically unfit(PMU) has risen. While no study has been conducted to co-relate fatigue with rising pilot TMU/PMU, fatigue is a major contributory factor for cardiac disease.

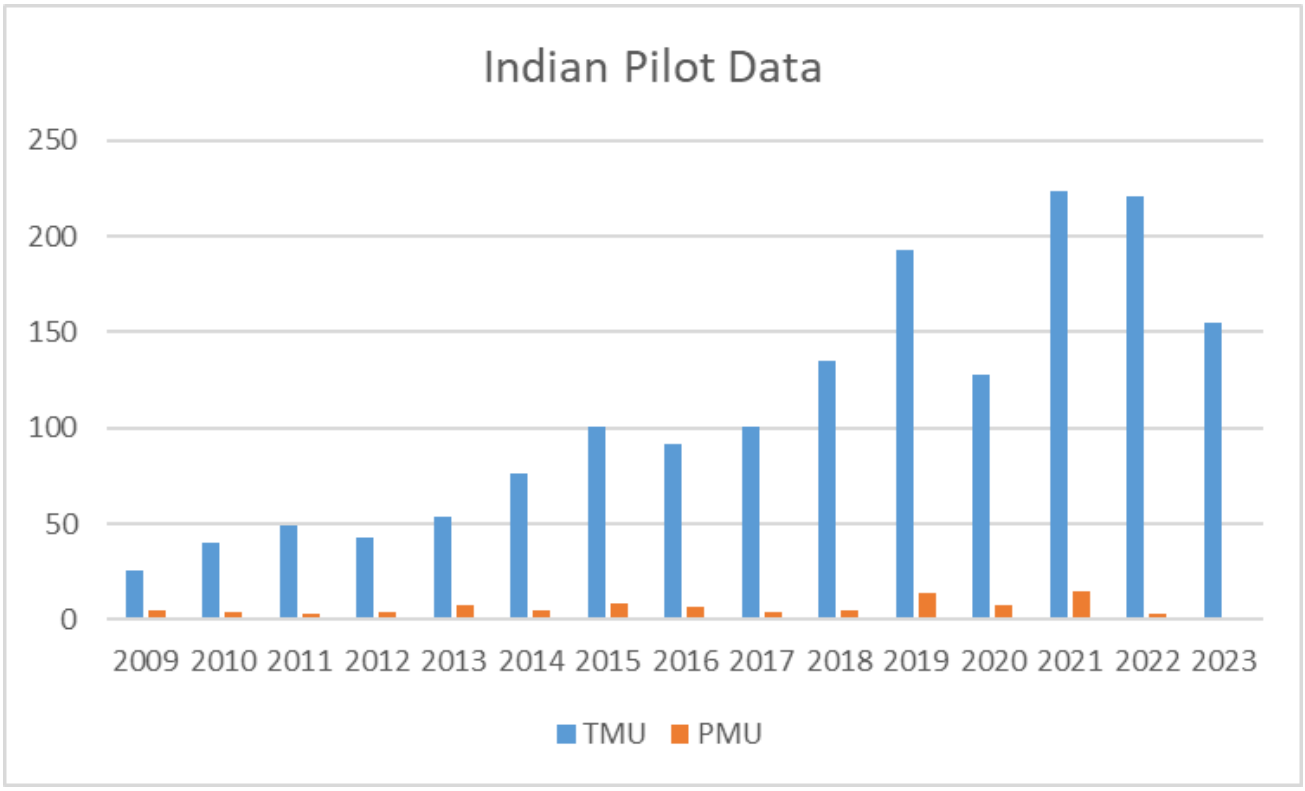

Figure 5: Indian Pilots TMU/PMU data based on insurance claims

- The safety management system (SMS) undertakes all safety processes. Neither the operator nor the regulator has conducted a risk assessment to determine a possible linkage between the pilot's medical condition and the schedules flown. The failure to find the cause is the failure of the SMS.
- The WHO and ILO have stated in a recent communique that 745,000 deaths have been recorded worldwide in 2016 due to stroke and ischemic heart disease. The two United Nations bodies have linked the deaths with excessive weekly work of over 55hrs. Pilots are permitted a duty period of 60 hours in 7 days, which exceeds the ILO rules and recommendations.
- The right to sleep is fundamental under the Indian Constitution; only a law can change it.
- Out of the four main sections of the survey, pilots were highly critical of the section under the heading "work schedule".

- 84% of pilots are concerned with the speed and direction of shift rotation.
- 83% of pilots are concerned with the onset of fatigue due to consecutive night flights.
- 81% of pilots are concerned that flights with minimum rest and rosters without buffers deeply impact fatigue.
- Nearly 76% of pilots considered the increasing flight duty period and landings as the week progressed to have a deep influence on the increase in fatigue.
- 70% of pilots in the survey considered that more than 10 hours of flight duty period profoundly influenced the onset of fatigue. NASA and EASA scientific studies have recommended a maximum of 10 hours of flight duty period.
- Studies have correlated the period of wakefulness with an equivalence of blood alcohol level. Seventeen hours of wakefulness can be equated with a blood alcohol level of 0.05%BAC. Directorate General of Civil Aviation (DGCA), India, permits 0.000% BAC during pre and post-flight tests.
- Age, marital status and number of children do not affect the fatigue influencing factor of more than 10 hours of flight duty.
- Several of the above-influencing factors have been listed in the existing Directorate General Civil Aviation (DGCA) civil aviation requirements (CAR) under the operator's responsibility. However, enforcement by the regulator is required.
- 40% of pilots feared reporting fatigue, and 30% considered the fear of reporting fatigue as a significant factor.

7. ANALYSIS

A) LIKERT SCALE

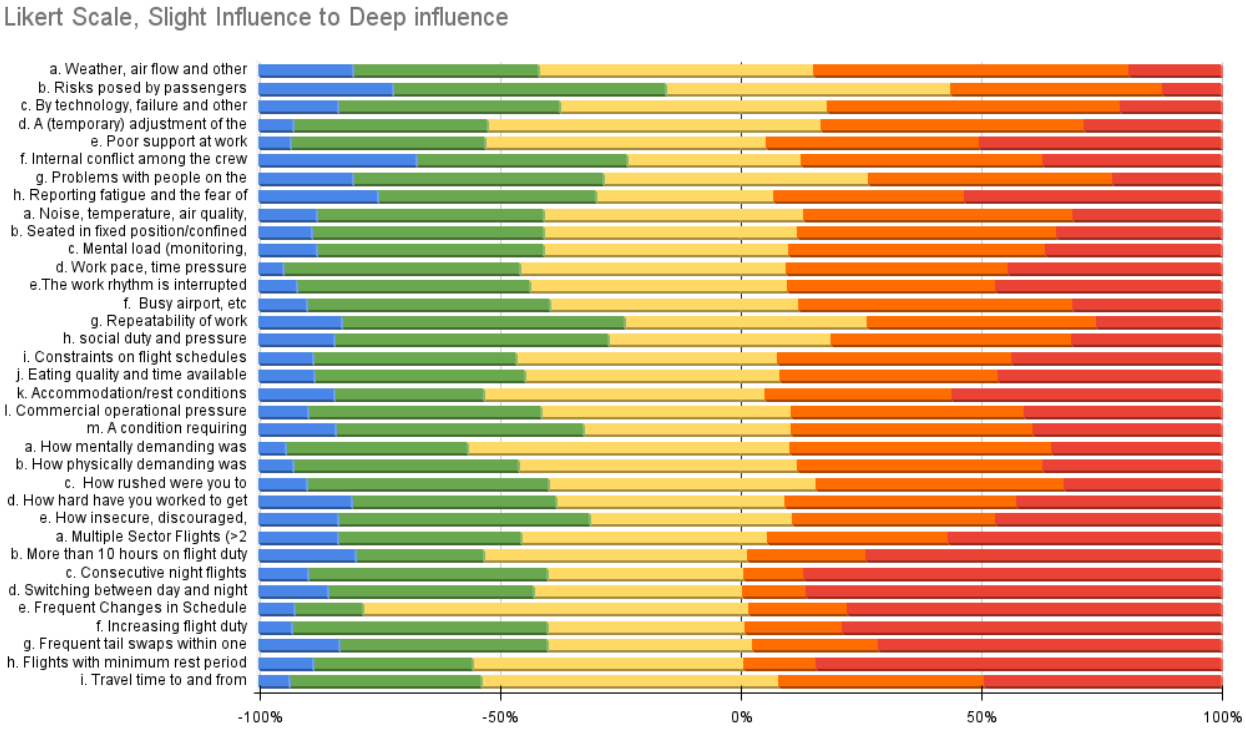

Figure 6: Likert scale

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1. The Likert scale, developed by Rensis Likert in 1932, is a psychometric scale commonly used in surveys to measure respondents' attitudes, perceptions, or opinions. It presents a statement and asks respondents to rate their level of agreement or disagreement on a symmetric agree-disagree scale. This scale ranges from "deep influence" to "slight influence".

The primary purpose of the Likert scale is to convert qualitative data into quantitative data, allowing for statistical analysis. Each option on the scale is assigned a numerical value, facilitating the calculation of mean scores, variances, and other statistical measures. This approach helps researchers gauge respondents' feelings about a particular topic and identify trends and patterns across a population.

The provided Likert scale chart visually represents the influence levels from various factors affecting pilots, ranging from "slight influence" in blue to "deep influence" in red. This gradient scale includes intermediate levels of "little influence," "moderate influence," and "significant influence."

1. High Influence Factors:

- Red Zones (Deep Influence): The chart indicates several factors that are perceived to have a deep influence on pilots. These include "work schedules", including long duty periods, consecutive night flights, flights with minimum rest, increasing flight duty towards the end of the block, frequent tail swaps, "Poor support at work," "Flight schedule adjustments," and "Insecure, discouraged feelings." The high concentration of red signifies these elements' profound impact on pilots' fatigue and stress levels.

- Orange Zones (Significant Influence): Many factors such as "Work pace, time pressure," "Commercial operational pressure," and "Consecutive night flights" fall into the significant influence category. These aspects notably affect pilots, suggesting substantial stress and fatigue due to these conditions.

2. Moderate Influence Factors:

- Yellow Zones (Moderate Influence): Factors like "Noise, temperature, air quality," "Physical and mental loads," and "Constraints on flight schedules" are commonly in the moderate influence range. These factors have a noticeable but not overwhelming impact on pilots, indicating areas where improvements can mitigate fatigue.

3. Low Influence Factors:

- Green Zones (Little Influence): Elements such as "Risks posed by passengers" and "Problems with people on the ground" fall into the little influence category. While they are acknowledged, their overall impact on pilot fatigue is less significant.

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- Blue Zones (Slight Influence): Factors like “By technology, failure and other risks” and “Weather, air flow and other environmental disturbances” show up as having a slight influence. These elements are present but have a minimal effect on overall fatigue and stress.

Implications:

The chart clearly identifies critical areas where pilot fatigue and stress are most and least impacted.

- Priority Areas: Immediate attention and resources should be directed towards mitigating the highest influence factors, particularly those in the deep and significant influence categories. Addressing “Poor support at work” and “Insecure, discouraged feelings” could significantly enhance pilot well-being and operational safety.

- Moderate Adjustments: Factors in the moderate influence range also warrant attention. Improvements in these areas can lead to a cumulative reduction in fatigue levels.

- Low Priority Areas: While still important, factors in the little and slight influence categories may be considered lower priority but should not be neglected entirely. Continuous monitoring is essential to ensure they do not escalate in impact.

Conclusion:

This Likert scale chart serves as a crucial tool for identifying and prioritising factors affecting pilot fatigue. By focusing on the areas of highest influence, aviation management can implement targeted strategies to enhance pilot health, performance, and overall safety in the aviation industry.

B) TYPE OF OPERATION

Analysis:

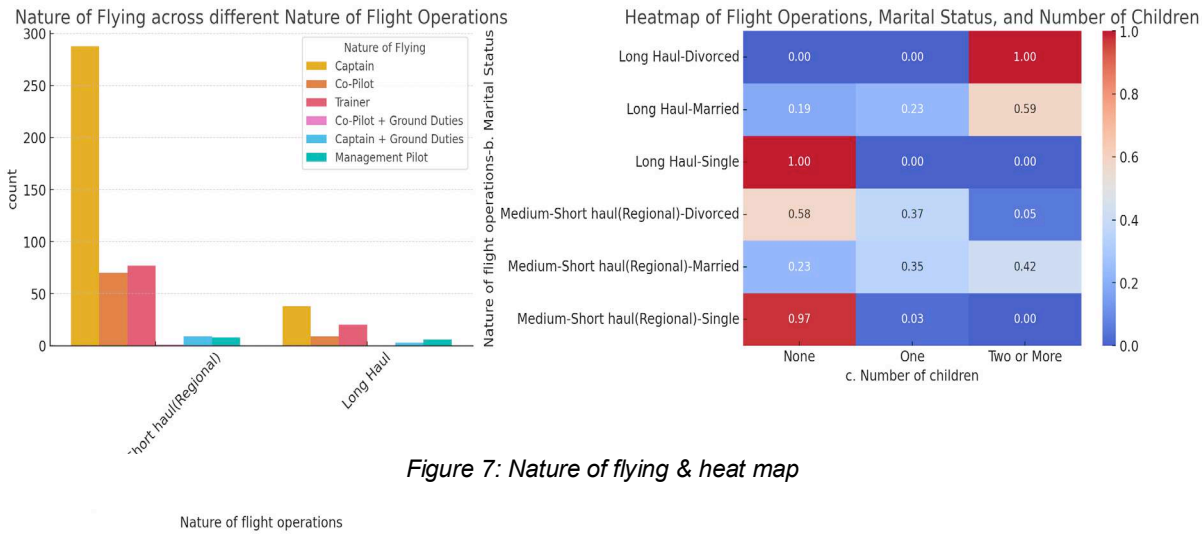

Figure 7: Nature of flying & heat map

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Most respondents are Captains, with a significant count in the “Medium-Short haul (Regional)” flight operation category.

Co-Pilots and Trainers also have notable counts but are much fewer than Captains.

“Long Haul” operations show fewer respondents across all flying roles.

Heatmap of Flight Operations, Marital Status, and Number of Children:

For “Long Haul” operations:

Divorced individuals have no children.

Married individuals often have one child.

For “Medium-Short haul (Regional)” operations:

Divorced individuals mostly have one child.

Married individuals have varying numbers of children, with a slight tendency towards having none or two or more.

Insights:

A high concentration of Captains in “Medium-Short haul (Regional)” operations suggests this category might be shared or preferred.

Family dynamics, such as marital status and the number of children, vary significantly with the nature of flight operations. Married pilots show a more diverse distribution regarding children.

Understanding these relationships can help design better support systems for pilots, considering their family structures and the nature of their flight operations.

These visualisations and insights can guide more targeted interventions and support mechanisms for pilots based on their specific circumstances and operational roles.

C) WORKING STATUS

Two areas highlighted in the survey results are:

Poor support at work

Reporting fatigue and the fear

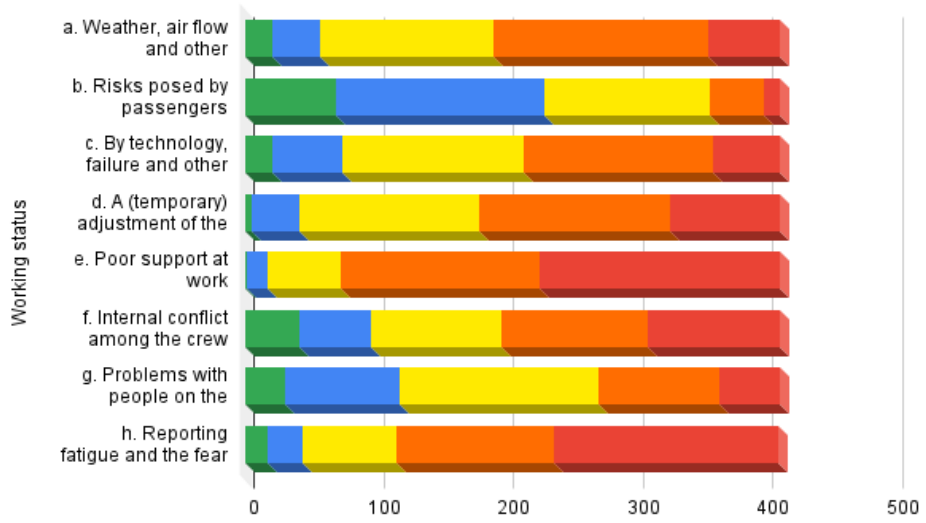

Figure 8: Working status

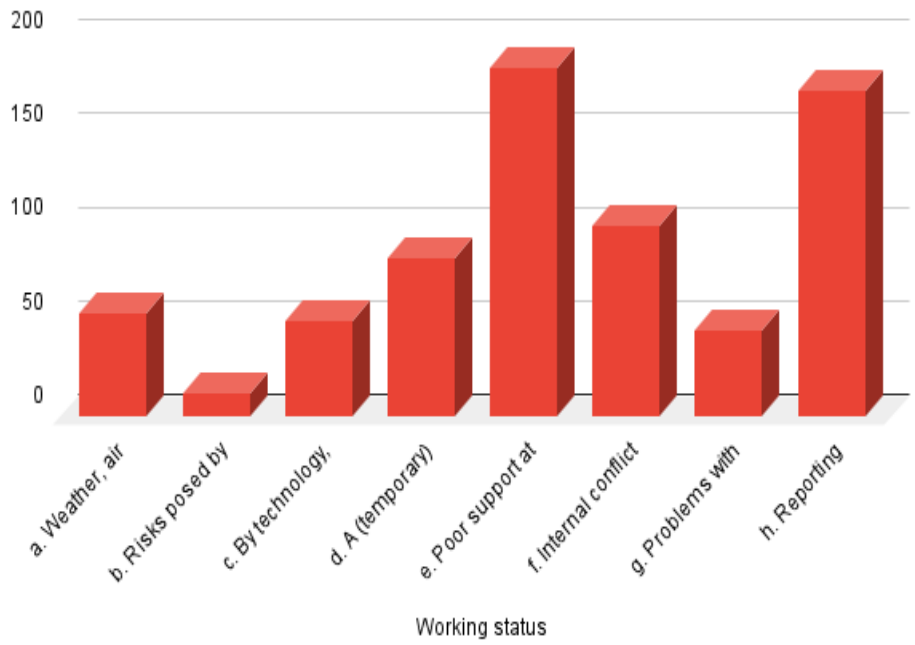

Figure 9:Deep influence

43 % of pilots believed that poor support at the workplace profoundly influences fatigue, while 38% considered it a significant influence.

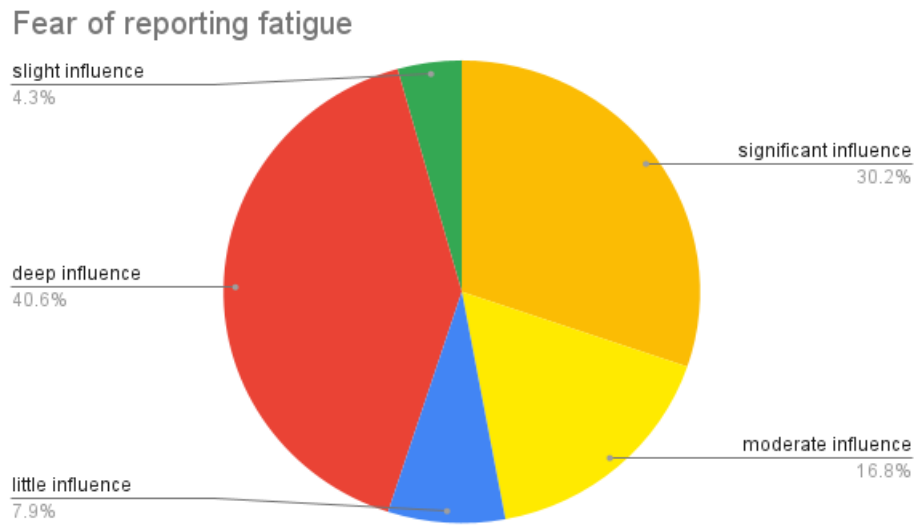

Figure 10: Fear of reporting fatigue

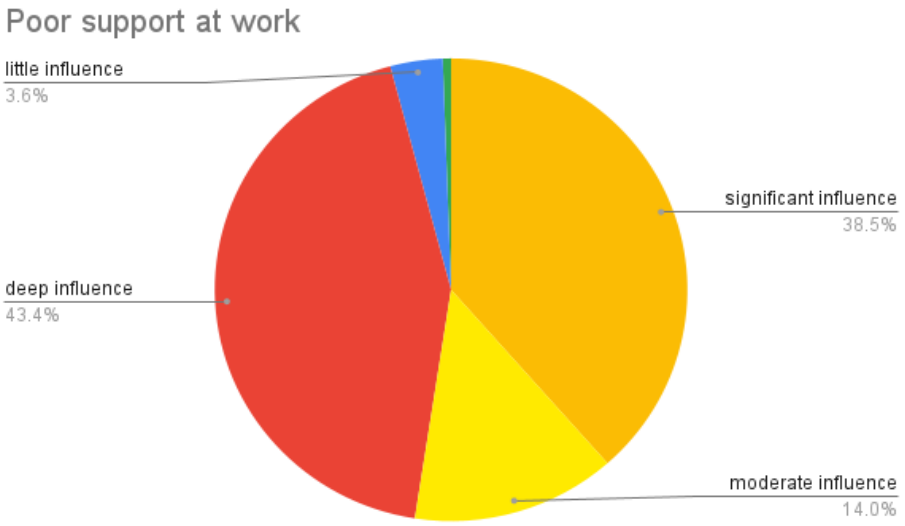

Figure 11: Poor support at work

Support in the workplace is the practical assistance and emotional support that managers, supervisors, or co-workers provide workers. Providing adequate support can help workers get through challenging situations at work. The availability or quality of support can vary depending on the type of work, industry and location of the workplace.

Poor support is when practical and emotional support is inadequate or not provided. Poor support can include when training, equipment, tools and resources, including adequate staffing, are insufficient for a worker to perform their role.

40% of pilots feared reporting fatigue, and 30% considered the fear of reporting fatigue as a significant factor.

Workplace fatigue is a state of physical and mental exhaustion that can significantly impact employee safety, productivity, and overall well-being. It's more than just feeling tired; fatigued workers have impaired judgment, reaction time, and decision-making abilities, increasing the risk of accidents and injuries. The organisational environment must be capable of supporting a culture where pilots are encouraged to report fatigue issues without fear of repercussions responsibly. Such just and fair cultures often must be carefully developed as the fatigue management process matures, or it will be self-limited at a low level. All stakeholders must act responsibly and with care to establish mutually trusting relationships that focus on creating an organisation that effectively manages its fatigue risk.

It's a collective responsibility: no one stakeholder group can succeed alone.

The recent termination of a Captain for reporting fatigue and others reprimanded directly or indirectly has most likely led to the respondent's behaviour in the survey response.

D) WORKING CONDITIONS

The focus here is on the working environment, adverse weather conditions, noise, temperature, vibrations, the presence of toxic and harmful substances, improper lighting and other aspects of the working environment; when something does not meet the physical and psychological needs of the pilot, it will increase the feeling of fatigue.

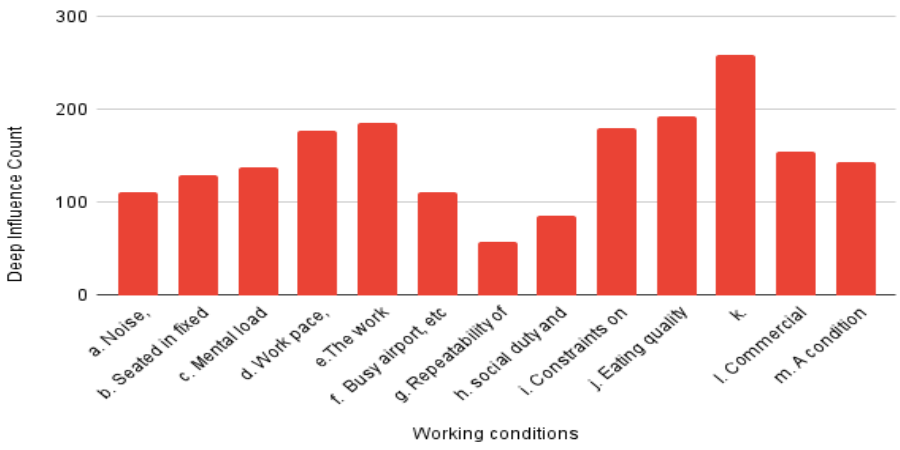

Figure 12:Deep influence

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Over the last two decades, several case studies and health surveys have been published describing the health effects of aircrew and passengers attributed to exposure to contaminated air. Hydraulic fluids and engine oils contain many toxic chemicals, including various organophosphates. The term “aerotoxic syndrome” (ATS) was proposed in 2000 to describe the short- and long-term health effects of breathing contaminated cabin air. However, reported symptoms are nonspecific, and cabin air quality studies indicate that contaminant levels are below occupational exposure limits and of no concern to human health. Furthermore, objective evidence of exposure is frequently lacking in previous case studies and surveys, and findings from routine medical and neurological examinations (including brain imaging) are often reported to be expected in symptomatic aircrew.

Cosmic radiation exposure at aircraft altitudes and circadian rhythm disruption due to travel through multiple time zones are two primary exposures hypothesised as cancer risk factors. While airlines are expected to monitor radiation exposure for long-haul pilots, there is a gap in effective monitoring.

There are, however, increasing reports of crew members facing health issues.

Several factors contribute to fatigue in working conditions.

Accommodation and rest conditions

Eating quality and time available to consume meals

Work rhythm interruptions

Work pace/time pressure

Constraints on schedules

The DGCA, India Civil Aviation Requirement on Fatigue Management of Flight Crew, defines suitable accommodation. The CAR requires a separate room for each crew member in a quiet environment, equipped with a bed sufficiently ventilated, a device for regulating temperature and light intensity, and access to food and drink.

49% of pilots consider the accommodation and rest conditions to deeply influence fatigue, while 34% consider the accommodation factor to influence fatigue significantly.

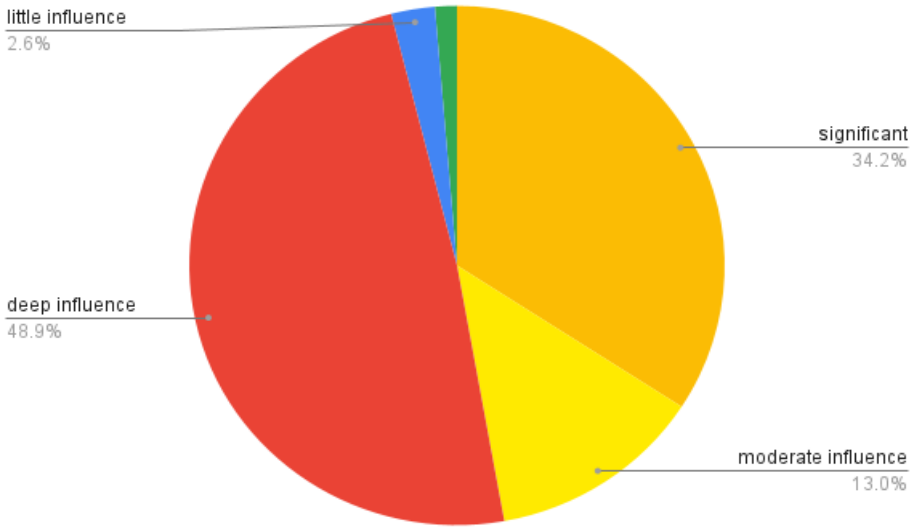

Figure 13: Accommodation

While the DGCA CAR has no provision for defining nutrition requirements and on-board meals for flight crew, regulators like EASA mandate nutrition requirements as a part of the operator's flight time specification scheme, which is subject to approval by the competent authority. Every industry provides meal breaks for their employees except for flight crew, who are expected to consume their meals simultaneously and perform their inflight duties without a break.

36% of pilots felt that eating quality and time available for meals deeply influenced causing fatigue, while 35% responded by considering this factor as significant.

Time pressure and interruptions can significantly impact the likelihood of accidents in aviation. These factors can affect pilots, air traffic controllers, and other aviation personnel, leading to errors and mishaps. Here's an overview of how time pressure and interruptions contribute to aviation accidents:

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Time Pressure

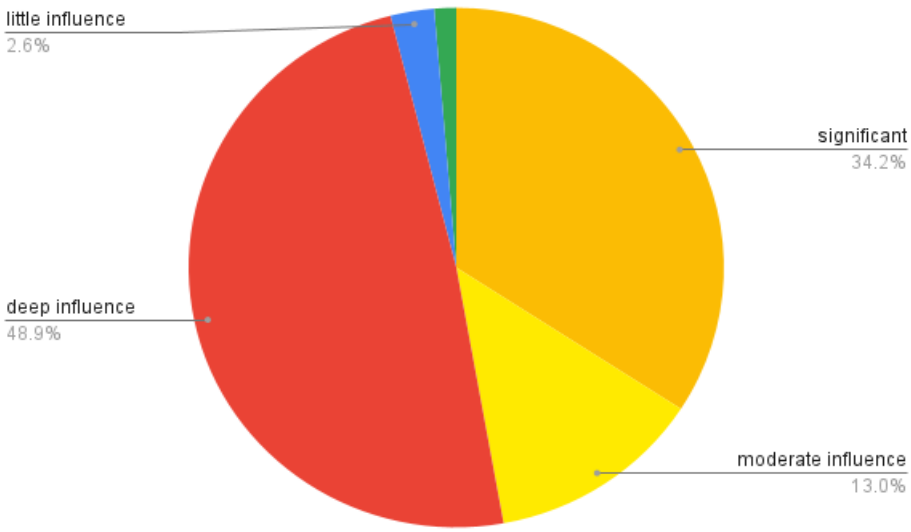

Figure 14:Time pressure

1. Decision-Making: Under time pressure, individuals may resort to heuristic or rule-of-thumb decision-making rather than thorough analysis. This kind of decision-making can lead to suboptimal choices.

2. Reduced Performance: Time pressure can increase stress and reduce cognitive resources, leading to decreased performance. Pilots may skip checklists or overlook essential procedures.

3. Fatigue: Prolonged periods of pressure can lead to fatigue, further impairing cognitive and physical performance.

4. Haste in Communication: In order to save time, communication may become hurried and less transparent, increasing the risk of misunderstandings between pilots and air traffic control.

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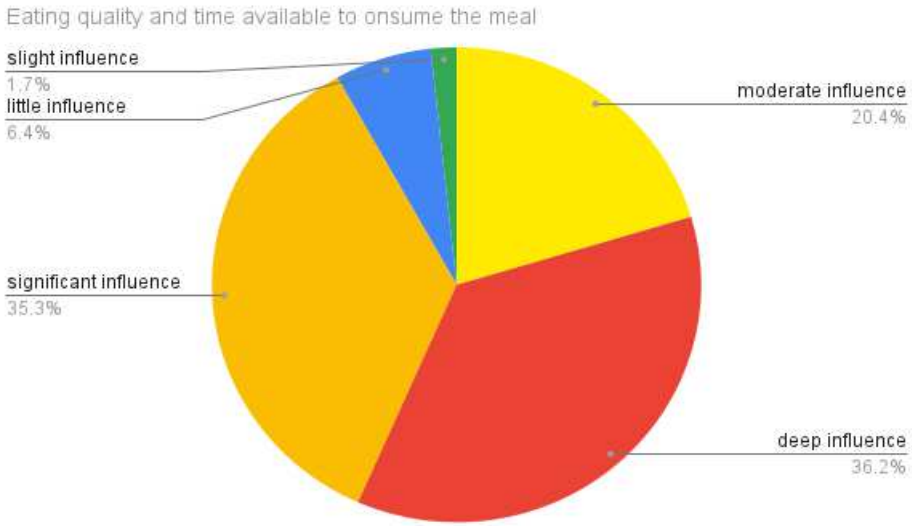

Figure 15: Eating quality & opportunity

1. Distraction: Interruptions can cause distractions that lead to a loss of situational awareness. For example, a pilot may be interrupted during a critical phase of flight, such as take-off or landing.

2. Task Management: Interruptions can disrupt the flow of tasks, making it difficult for aviation personnel to keep track of their progress and leading to incomplete or forgotten tasks.

3. Increased Workload: Handling interruptions requires additional cognitive resources, increasing the overall workload. This can lead to errors, especially when combined with time pressure.

4. Delayed Responses: Interruptions can delay the response to critical events, as attention is diverted to handling the interruption rather than addressing the primary task.

Case Studies and Examples

A 100t weight error led the tail-strike protection mechanism to activate on an Air France Boeing 777F, spurring the crew to command full take-off thrust.

Take-off parameters for the aircraft (F-GUOC) had been calculated using a weight of 243t rather than the actual figure of 343t, says French investigation authority BEA in its findings from the 22 May 2015 incident.

This gross error meant the calculated rotation speed of 152kt, with flap position 5, was far below 175kt, and flap 15 was required.

A 40t error was made on El Al flight 027 from Tel Aviv to Newark in 2018, whose harried staff was trying to rush through the pre-flight checklist to expedite an already late departure. The pilot input the incorrect weight of 128.6 tons for the plane without fuel, exactly 40 tons short of the correct figure of 168.6 tons, causing an El Al Boeing 787-9 to struggle to become airborne from Tel Aviv.

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Conclusion: Time pressure and interruptions are significant risk factors in aviation accidents. Understanding their impact and implementing effective mitigation strategies are crucial for enhancing safety and reducing the likelihood of accidents in the aviation industry.

Work pace and time pressure deeply impacted fatigue, as 33% of pilots and 35% considered work rhythm and interruption a cause of fatigue.

E) WORKLOAD

The effort and hard work someone puts into achieving their goals can significantly influence their level of fatigue. Here are some key points on how this connection typically works:

1. Physical Fatigue: Intense physical labour or prolonged physical activity can lead to muscle fatigue and overall tiredness. Physical fatigue is often seen in people with physically demanding jobs or those who engage in intense exercise.

2. Mental Fatigue: Long hours of cognitive work, such as problem-solving, studying, or working on complex projects, can cause mental exhaustion. Mental fatigue is common in professions that require a high level of concentration and mental effort.

3. Emotional Fatigue The emotional stress associated with hard work, such as dealing with high-pressure environments, complicated interpersonal relationships, or personal challenges, can lead to emotional exhaustion.

4. Sleep Deprivation: Working long hours or under stressful conditions can impact sleep quality and quantity, leading to sleep deprivation and chronic fatigue.

5. Burnout: Prolonged periods of intense work without adequate rest and recovery can lead to burnout, characterised by physical, emotional, and mental exhaustion.

6. Work-Life Balance: The balance between work and personal life plays a crucial role. An imbalance, where work demands overwhelm personal time and relaxation, can increase fatigue.

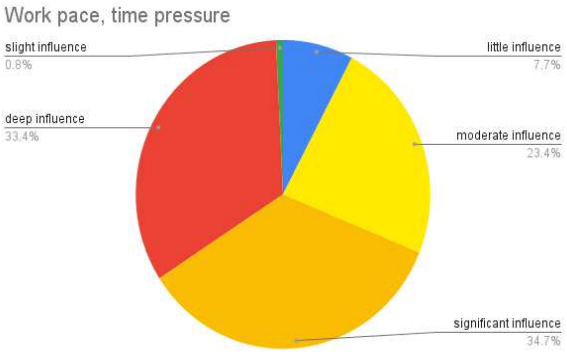

Figure 17: work pace, time pressure

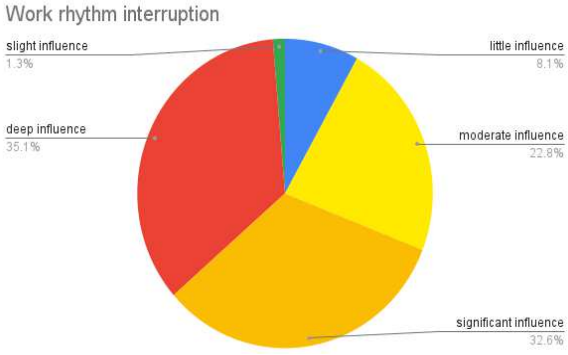

Figure 16: Work rhythm & interruption

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Managing fatigue involves incorporating regular breaks, adequate sleep, physical exercise, relaxation techniques, and a healthy work-life balance.

Figure 18: Hard work

31% of pilots attributed the hard work that they have put in to reach where they are as a profound causation factor of fatigue. The current flight and duty time limitations do not cater to an individual's requirement for a work-life balance. The weekly extended rest period is the only time the pilot can socialise as a member of society. As a result, rest is sacrificed to stay in touch with society and stay relevant. Similarly, to keep themselves fit, the crew has to take time from the rest period when working, which is scheduled for the maximum duty permissible.

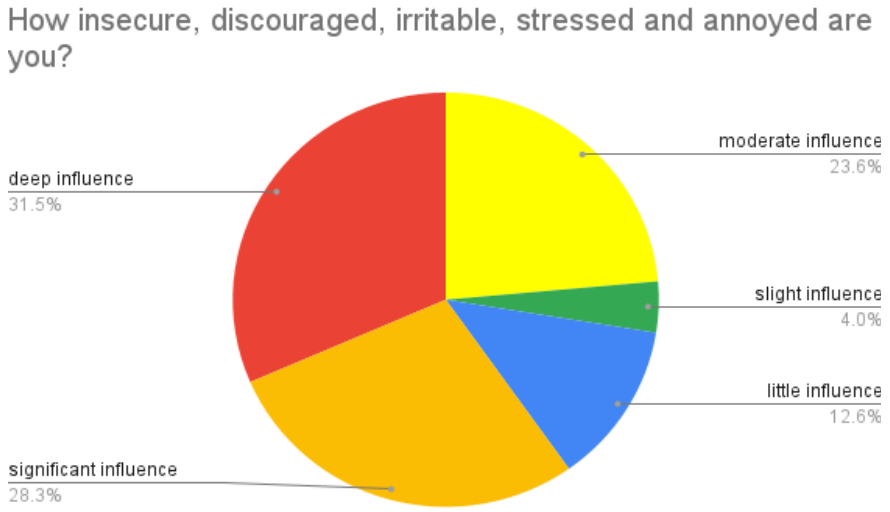

Figure 19:Insecure, irritable, stressed & annoyed

Like many professionals in high-stress jobs, pilots experience a range of emotional and psychological factors that can profoundly influence their fatigue levels. 31% of pilots attributed this factor to profoundly influencing fatigue. Here's how these factors can affect pilots:

1. Insecurity: Concerns about job performance, job security, or the consequences of making mistakes can create a constant underlying stress contributing to mental and emotional fatigue.

2. Discouragement: Repeated challenges, setbacks, or failures can lead to feelings of discouragement. This can diminish motivation and increase the perception of effort, enhancing fatigue.

3. Irritability: Fatigue itself can lead to irritability. Also, dealing with difficult situations, long hours, and high-stakes decisions can make pilots more irritable, increasing stress and fatigue.

4. Stress: The high responsibility of ensuring passenger safety, navigating complex airspaces, and making critical decisions under pressure contributes significantly to stress. Chronic stress is a well-known factor in developing both physical and mental fatigue.

5. Annoyance: Frustrations with delays, technical issues, or interactions with colleagues and passengers can contribute to a build-up of annoyance, adding to overall emotional exhaustion.

These factors collectively create a challenging environment for pilots, making it essential for them to have effective coping mechanisms and support systems. Implementing stress management techniques, ensuring adequate rest, and promoting a positive work environment can help mitigate these influences and reduce fatigue.

F) WORK SCHEDULES

Work schedules are crucial in influencing fatigue levels, especially in professions like aviation, healthcare, and emergency services. Here's how different aspects of work schedules can deeply impact fatigue:

1. Irregular Hours:

- Shift Work: Rotating or irregular shifts can disrupt the body's natural circadian rhythms, leading to difficulty sleeping and increased fatigue.

- Night Shifts: Working at night can be particularly challenging because it goes against the body's natural inclination to sleep during darkness.

2. Long Hours:

- Extended Workdays: Working longer than the typical 8-hour day can lead to physical and mental exhaustion.

- Overtime: Frequent overtime can reduce the time available for rest and recovery, leading to cumulative fatigue.

3. Lack of Rest Days:

- Insufficient Days Off: Not having enough rest days between work periods can prevent adequate recovery, causing chronic fatigue.

- Back-to-Back Shifts: Consecutive workdays without a break can lead to a buildup of fatigue over time.

4. On-Call Schedules:

- Unpredictability: Being on call can lead to interrupted sleep and increased stress, as individuals must be prepared to work at any moment.

- Disrupted Sleep Patterns: On-call duties can disrupt sleep, leading to insufficient rest.

5. Early Start Times:

- Pre-Dawn Shifts: Early start times can cut into valuable sleep periods, especially if they require waking up in the middle of the night.

- Sleep Inertia: Starting work very early can lead to grogginess and impaired performance due to sleep inertia, the period of reduced alertness immediately after waking.

6. Time Zone Changes:

- Jet Lag: For professions involving travel across time zones, like piloting, jet lag can disrupt sleep patterns and lead to significant fatigue.

- Circadian Misalignment: Constantly changing time zones can cause a misalignment between the internal body clock and the external environment.

7. Workload and Intensity:

- High Demands: High workloads and intense job demands can exacerbate the effects of long hours and irregular schedules, leading to increased fatigue.

- Mental and Physical Demands: Jobs that require constant attention, decision-making, and physical activity can be particularly fatiguing when combined with challenging schedules.

Mitigation Strategies:

- Strategic Scheduling: Implement schedules that allow regular sleep patterns and sufficient rest periods.

- Rest and Recovery: Ensuring adequate rest days and minimising consecutive long shifts.

- Supportive Policies: Support employees dealing with jet lag or shift work, such as allowing for gradual adjustment to new schedules.

- Health and Wellness Programs: Promoting healthy sleep habits and stress management techniques to help employees cope with demanding schedules.

Employers can create a healthier, more productive work environment by recognising and addressing the impact of work schedules on fatigue.

The first study to correlate fatigue with the number of landings was carried out in the USA, and the report was published in 2015. The study “Fatiguing Effect of Multiple Take-Offs and Landings in Regional Airline Operations” by Kimberly A. Honn, Brieann C. Satterfield, Peter McCauley, J. Lynn Caldwell, Hans P.A. Van Dongen.

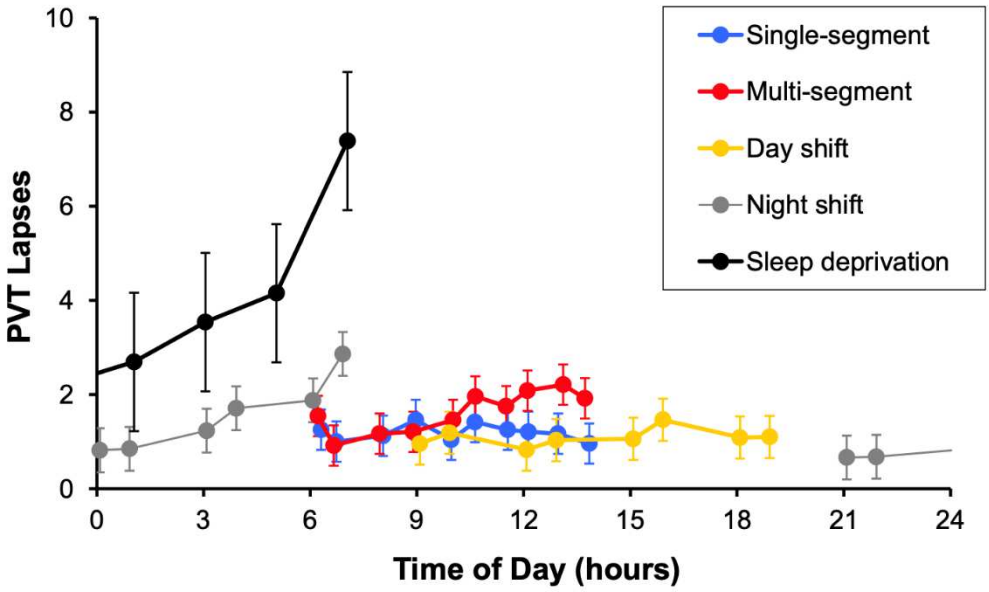

Figure 20: Multi-sector flight

This study was the first to provide systematic evidence on the fatiguing effect of flying multiple segments as a factor relevant to duty duration. The data set comprised a total of 432 duty hours, 72 take-offs and landings, and 480 fatigue test bouts (including 4,800 minutes of Psychomotor Vigilance Test (PVT) performance). In this regard, and in the degree of realism and operational detail, the experiment stood out among aviation fatigue studies in simulated operational settings (cf. Caldwell et al., 2000, 2004; Elmenhorst et al., 2009; Thomas et al., 2006).

Pilots’ performance on the PVT indicated more significant fatigue on the five-segment duty day than on the single-segment duty day.

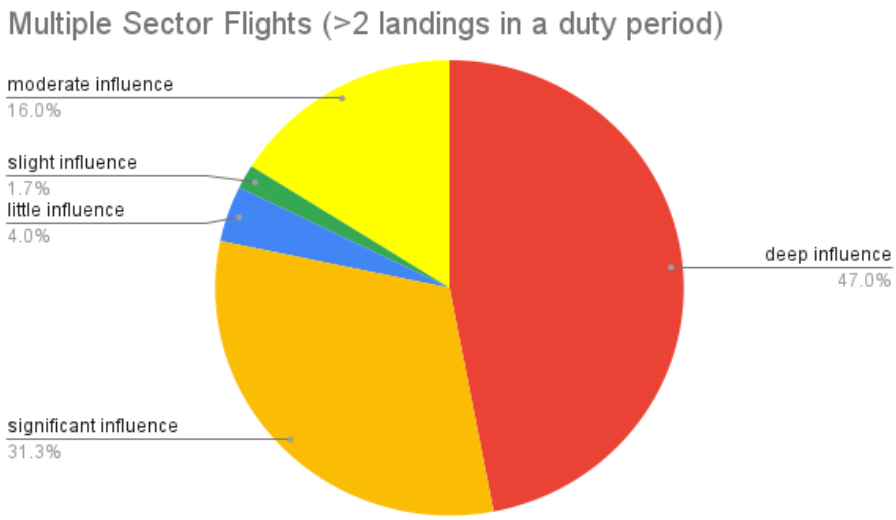

Figure 21: More than two landings

47% of pilots considered more than two landings in a duty period to influence fatigue deeply. Of the 47% of pilots, 91.5% were flying Medium-Short haul operations. In the survey, 77% of pilots carried out 3-4 landings on average during a single duty period, 21.3% carried out two, and 1.7% carried out 5-6 landings.

Therefore, pilots flying medium-short haul flights are more concerned with the number of landings they carry out and the influence of fatigue.

The earliest scientific study carried out by National Aeronautics and Space Administration (NASA) Ames Research Center Moffett Field, California, Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation in a 1996 study noted that 2.3.3 Standard flight duty period- To reduce vulnerability to performance-impairing fatigue from extended hours of continuous wakefulness and prolonged periods of continuous performance requirements, cumulative flight duty per 24 hours should be limited. “It is recommended that for standard operations, this cumulative flight duty period not exceed 10 hours within a 24-hour period.” Standard operations include multiple flight segments and day or night flying.

Duty length has been associated with the risk of accidents. For duties of 10-12 hours, the relative risk of an accident was 1.7 times higher than for all duties, and for duties of 13 hours or more, the relative risk was over 5.5 times higher [Goode JH, 2003]. (MOBEUS Report)

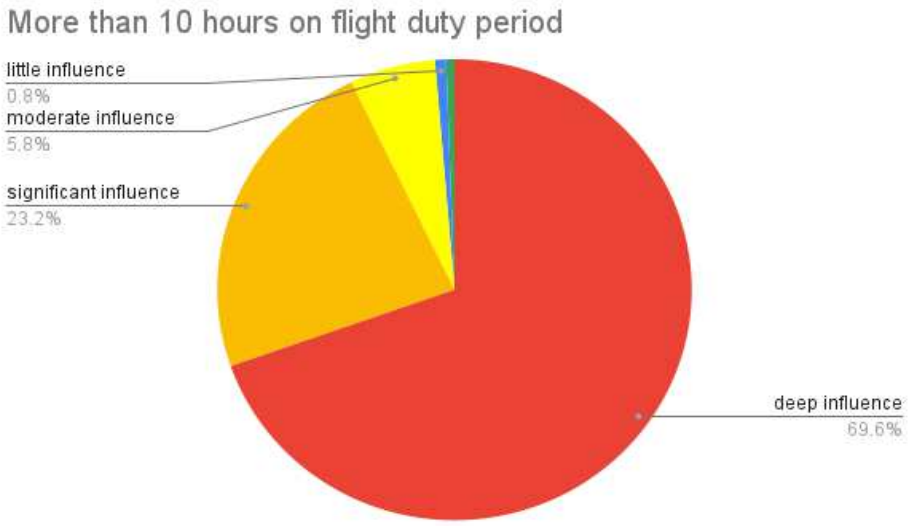

Figure 22: More than 10hrs FDP

Nearly 70% of pilots in the survey considered that more than 10 hours of flight duty period profoundly influenced the onset of fatigue.

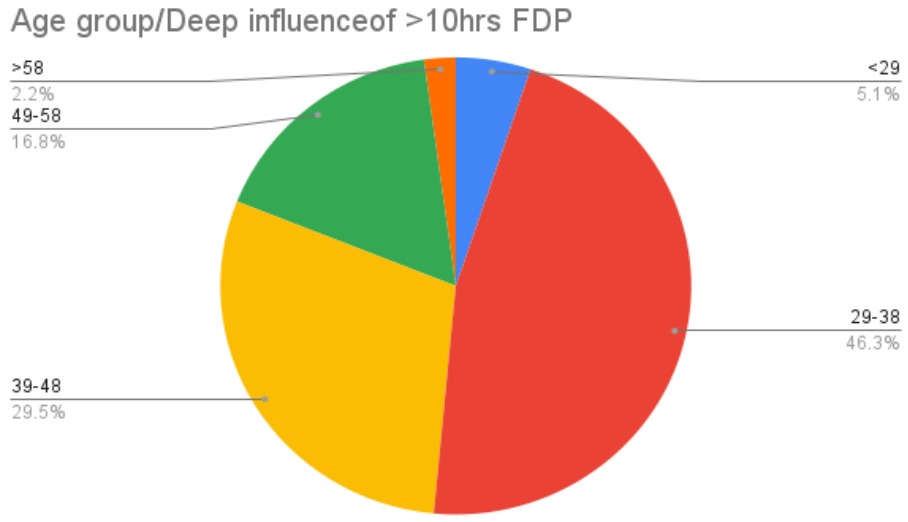

Figure 23: Age/Deep influence >10 hrs FDP

46% of pilots aged 29-38 consider more than 10 hours of FDP to influence fatigue deeply. This age group comprised 40% of the total respondents to the survey. Of these pilots, 79% were Captains, 80% were married, 34% had two or more children, 29% had one child, and 37% did not have children.

Therefore, the young and middle-aged segment is concerned with fatigue related to more than 10 hours of flight duty, irrespective of their marital status or number of children. The current DGCA, India flight and duty time limitations permit 13 hours of flight duty period in 24 hours. The European Aviation Safety Regulator (EASA), EASA's scientific study states

that the currently allowed maximum daily flight duty period of 13-14 hours “exceeds reasonable limits” and is “not in keeping with the body of scientific evidence”; it should, therefore, be reduced.

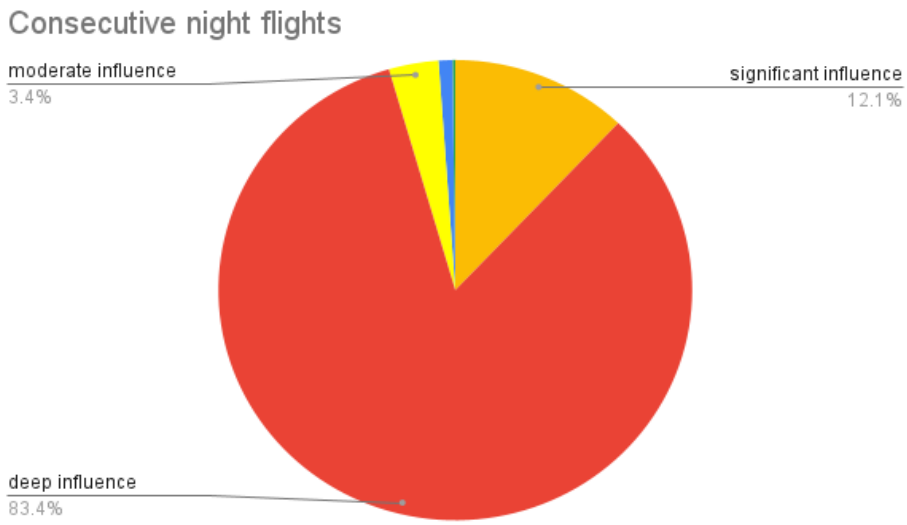

Figure 24: Consecutive flights

A resounding 83% of pilots are concerned with the onset of fatigue due to consecutive night flights. The effects of restricting sleep night after night accumulate, so people become progressively less alert and less functional daily. This is sometimes described as accumulating a sleep debt. The pressure for sleep increases progressively across successive days of sleep restriction. Eventually, it becomes overwhelming, and people begin falling asleep uncontrollably for brief periods, which is known as micro-sleep. During a micro-sleep, the brain disengages from the environment (it stops processing visual information and sounds). The usual recommendation for a recovery opportunity is for a minimum of two consecutive nights of unrestricted sleep. Some recent laboratory studies of sleep restriction suggest that this may not be enough to bring crew members back up to their optimal level of functioning. There is evidence that the sleep-restricted brain can stabilise at a lower level of functioning for long periods of time (days to weeks). Recovery from sleep debt typically requires consecutive nights of regular sleep hours.

The results of a study by A M Williamson, Anne-Marie Feyer from the School of Psychology, University of New South Wales, Sydney, Australia, on “Moderate sleep deprivation produces impairments in cognitive and motor performance equivalent to legally prescribed levels of alcohol intoxication”, the results showed, after 17–19 hours without sleep, corresponding to 2230 and 0100, performance on some tests was equivalent or worse than that at a BAC of 0.05%.

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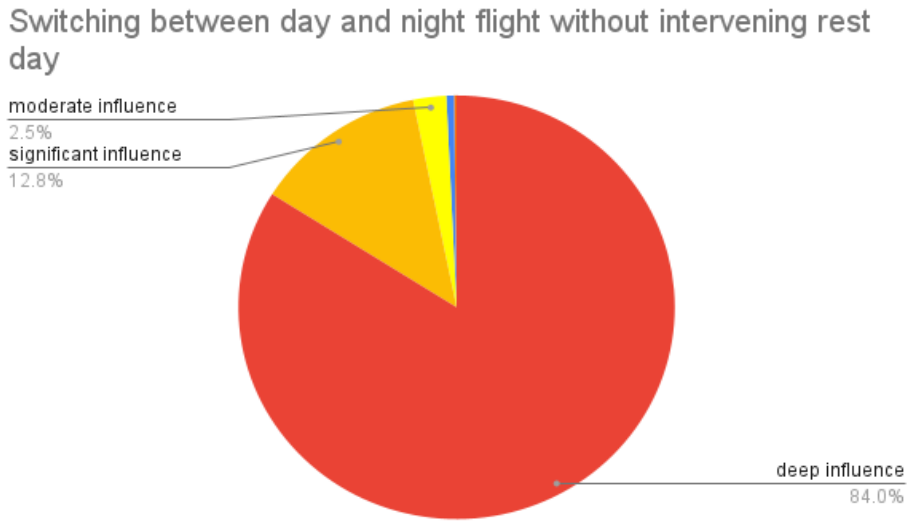

Figure 25: Switching flight periods

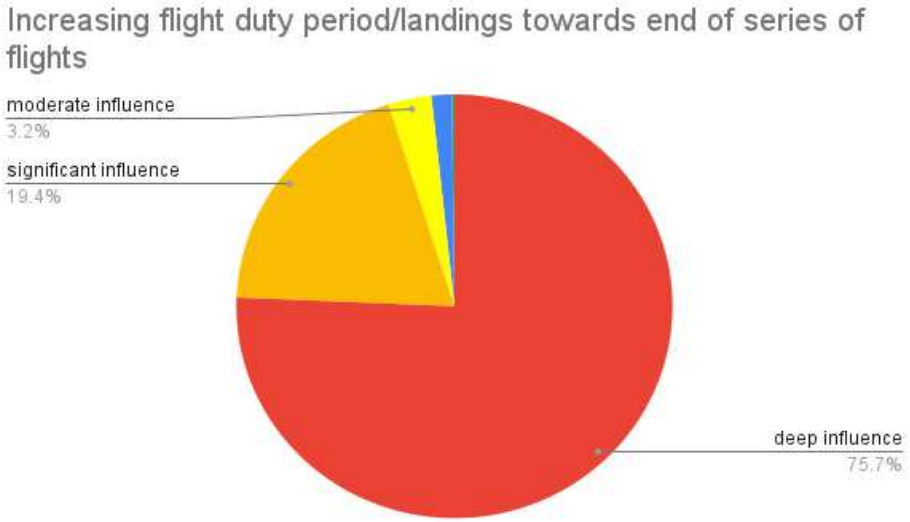

Figure 26: Increasing FDP towards end of block

84% of pilots are concerned with the speed and direction of shift rotation. 73% of these pilots were in the age group of 29-48.

Nearly 76% of pilots considered the increasing flight duty period and landings as the week progressed to have a deep influence on the increase in fatigue.

ICAO Doc 9966 on fatigue management refers to speed and direction of shift rotation. Shift patterns can be classified according to the speed (fast or slow) and direction (forward or backwards) of rotation. When the timing of duty periods changes rapidly from one day to the next (also known as a rapidly rotating schedule), the circadian biological clock cannot adapt to the pattern of work and rest. The advantage of this is that on days off, an individual's circadian biological clock is still aligned with the normal day/night cycle, and symptoms of circadian disruption are minimised. The downside of rapidly rotating schedules is that at certain times, such as on the night shift, an individual will be working when their

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circadian drive for sleepiness is high and their performance is at its poorest. A slowly rotating schedule (e.g. a week of early morning shifts) is more likely to result in some circadian adaptation, but then on days off, an individual will be slightly out of alignment with the normal day/night cycle, and some readaptation needs to occur. The DGCA India CAR requires the operator to plan the rosters to avoid alternating day/ night or late night/early morning duties.

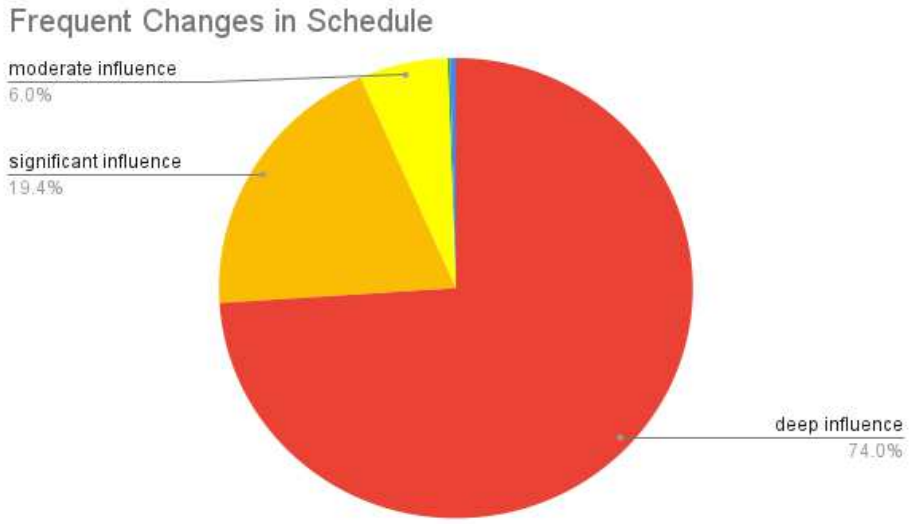

Figure 27: Frequent changes

The DGCA CAR states that each operator shall prepare the Flight Crew Roster sufficiently in advance. The roster should be published for at least a 7-day period, and the weekly rest shall be printed on the published roster. Frequent changes in the roster could mean constant changing from overload to underload. A pilot typically plans his personal life and fitness around the roster. Any change in the roster would have an impact on the two.

74% of pilots consider that frequent schedule changes deeply influence fatigue causation. Refer to the comments section G)—comments number 33,49,50,61,73,77,101,104,118,133,134,151,173.

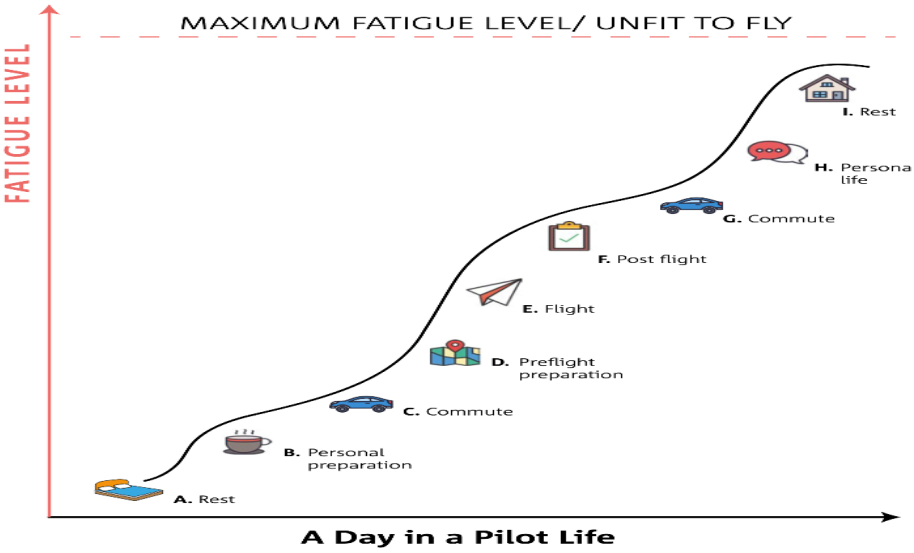

Figure 28: Day in the life of a pilot (Credit:EASA)

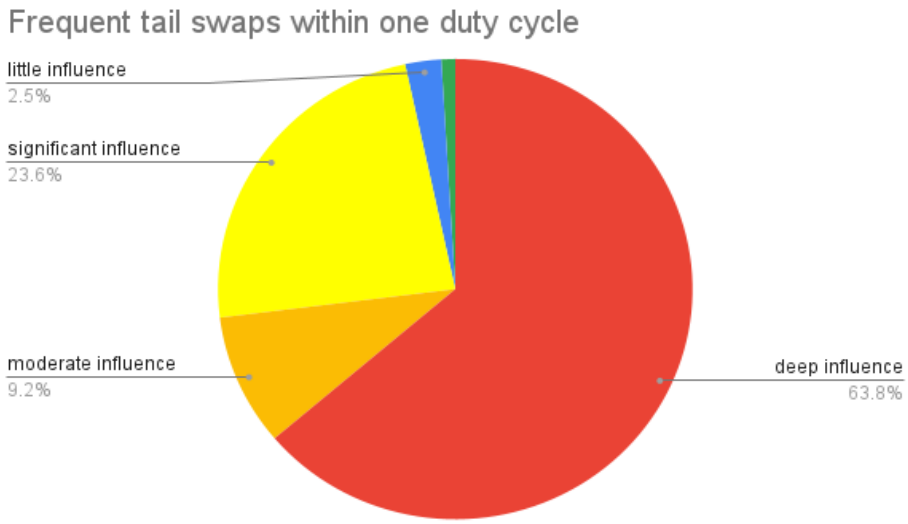

Figure 29: Frequent tail swap

63% of pilots attributed fatigue to being deeply influenced by frequent tail swaps in a flight duty period. Frequent changes would mean that due to a change of aircraft once or more in a flight duty period. The crew cannot directly transfer from one aircraft to the second. Before boarding the assigned aircraft, the crew must proceed to the terminal and undergo security frisking. Frequent tail swaps, when combined with other factors like maximum flight duty, minimum rest and multiple landings, can compound the increase of fatigue.

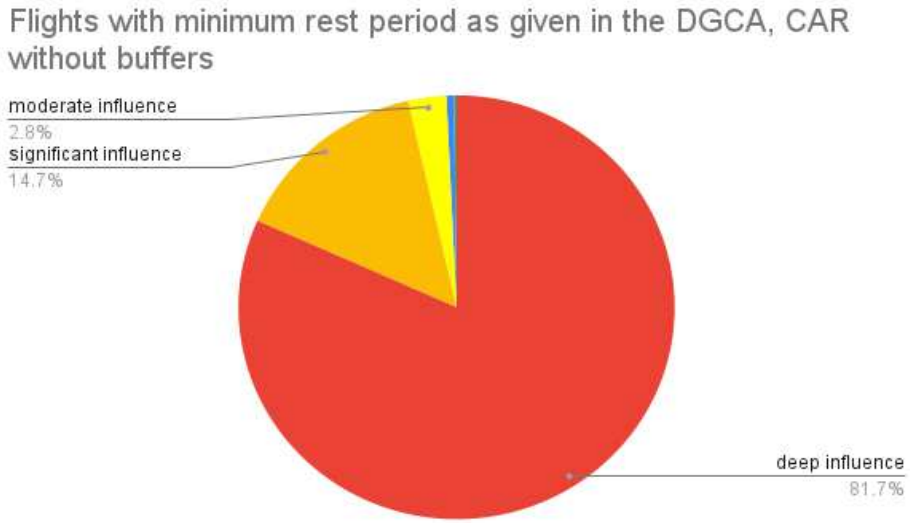

Figure 30: Flights with minimum rest

The DGCA India CAR mandates that every operator should try to balance commercial imperatives and crew members' ability to work effectively. FDTL limits given in the DGCA CAR are the 'outer limits' and should be treated with sufficient rest periods after long flight duty periods.

When 81% of pilots are concerned that flights with minimum rest and rosters without buffers deeply impact fatigue, the crew are indicating that they are nearing a burnout stage due to maximisation of their deployment to satisfy the commercial objectives.

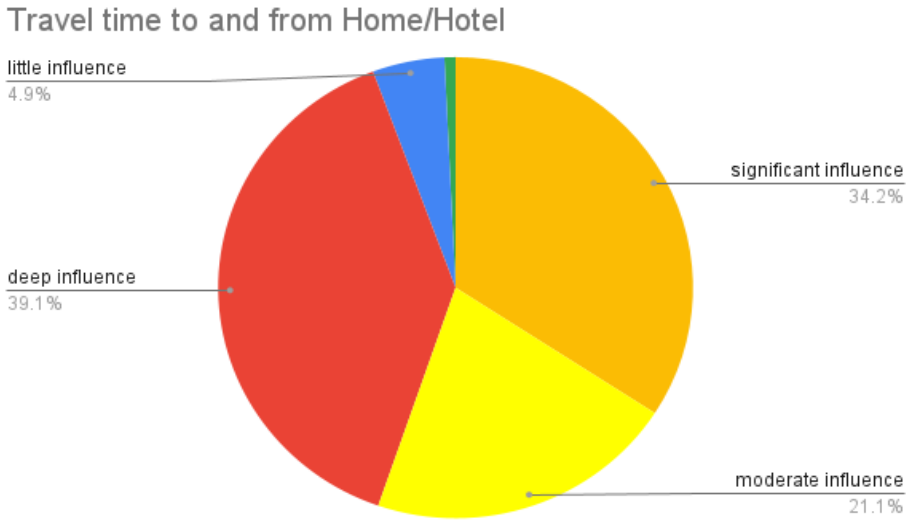

Figure 31: Time to travel

As the travel times to and from the residence/hotel to the workplace increase steadily, there is a need to calculate realistic transit times to provide adequate rest and sufficient sleep to the crew.

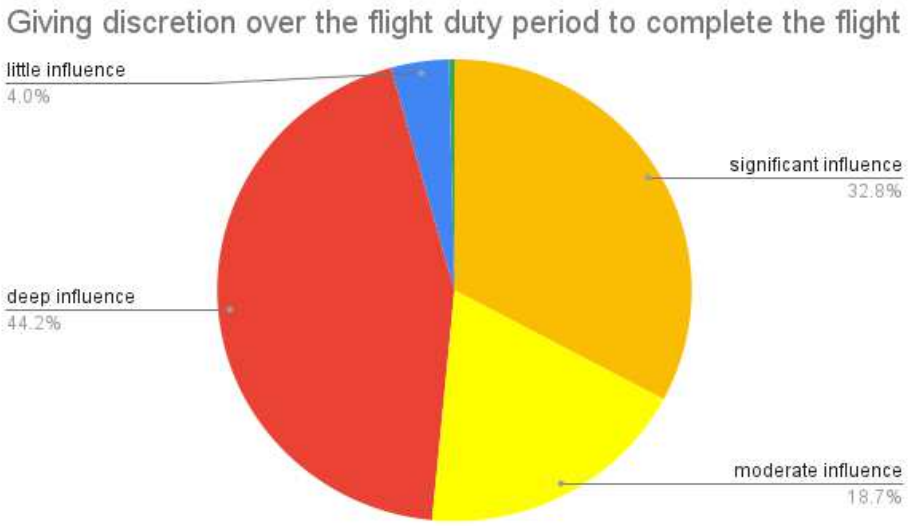

Figure 32: Discretion of FDP

The need to give the discretion to complete the flight arises when the flights are planned to the limits. The need to provide frequent discretions will not occur, and this becomes an exception when buffers are built into the scheduling system, and a pressure test is performed to check the robustness.

8. CONCLUSION

The findings from the 2024 Safety Culture Survey on Fatigue Factors provide a comprehensive understanding of the fatigue-related challenges faced by pilots. This detailed analysis reveals the multifaceted nature of fatigue and its significant impact on aviation safety and pilot performance.

Summary of Key Findings

1. Time Pressure and Interruptions:

- Impact: Pilots frequently experience time pressure and interruptions during flights, which are significant contributors to cognitive fatigue. These stressors force pilots to rely on heuristic decision-making, leading to suboptimal performance and increased error rates.

- Mitigation: Effective strategies to mitigate these risks include enhanced scheduling practices, better communication protocols, and the incorporation of buffer times in flight schedules.

2. Frequent Tail Swaps:

- Impact: The survey indicates that frequent tail swaps, often combined with maximum allowable flight duty periods and minimum rest requirements, significantly increase fatigue levels among pilots. This practice disrupts circadian rhythms and contributes to cumulative fatigue, which is a critical safety concern.

- Mitigation: Limiting the frequency of tail swaps and ensuring adequate rest periods between flights can help mitigate this issue. Additionally, developing policies that consider the biological needs of pilots can reduce the risk of fatigue-related errors.

3. Rest and Roster Management:

- Impact: Many pilots report that current rest periods and roster management practices are insufficient to mitigate fatigue effectively. The instability of rosters and the prevalence of minimum rest periods fail to provide adequate recovery time, leading to chronic fatigue.

- Mitigation: Implementing more stable and predictable rostering practices and ensuring rest periods that align with scientific recommendations can enhance pilot well-being and safety.

4. High Influence Factors:

- Impact: Factors such as extended duty periods, consecutive night flights, and inadequate support at work are identified as having a high influence on pilot fatigue. These factors exacerbate stress and fatigue, leading to decreased performance and increased safety risks.

- Mitigation: Addressing these high-influence factors through targeted interventions, such as limiting consecutive night flights and providing better workplace support, can significantly reduce fatigue.

5. Pilot Feedback:

- Concerns: Pilots have raised concerns about the effectiveness of current fatigue risk management systems (FRMS). They also emphasise the need for more robust scientific studies on fatigue and better consideration of emotional and social factors in fatigue management.

- Recommendations: Enhancing FRMS by integrating pilot feedback, conducting comprehensive scientific studies on fatigue, and developing holistic management approaches considering all aspects of pilot well-being are crucial steps forward.

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Recommendations for Future Actions

1. Enhanced Scheduling and Rest Policies:

- Implement more flexible scheduling practices that allow buffer times to accommodate unforeseen delays and prevent frequent discretions.

- Ensure that rest periods between flights are adequate and aligned with scientific recommendations to support effective recovery and reduce cumulative fatigue.

2. Focused Interventions on High Influence Factors:

- Prioritise addressing the most significant contributors to fatigue, such as extended duty periods and consecutive night flights, through targeted interventions.

- Provide better support systems at work, including mental health resources and stress management programs, to enhance pilot resilience and well-being.

3. Comprehensive Fatigue Management:

- Develop a more robust FRMS incorporating scientific research, public reports, and pilot feedback to create evidence-based policies.

- Recognise and address the multifaceted nature of fatigue, considering mental, emotional, and physical aspects in fatigue management strategies.

4. Pilot-Centric Approaches:

- Engage with pilots regularly to gather insights and feedback on fatigue management practices.

- Foster a safety culture prioritising pilot health and well-being, ensuring their needs and concerns are central to policy development.

By taking these actions, the aviation industry can create a safer and more sustainable working environment for pilots. Addressing the root causes of fatigue and implementing comprehensive management strategies will enhance performance, reduce errors, and improve flight safety.

9. COMMENTS BY THE RESPONDENTS

1. None
2. HR SUCKS
3. In Indian Air space the flying stresses is far greater than flying anywhere else in the world.
4. Uncertainty of published roster, like too many stby, pull out from stby changing entire weeks published roster, unscientific approach in definition of early morning reporting, combining other sectors with critical sectors (Srinagar)/demanding sectors(Mumbai), OTP issues.
5. Frequent Roster instability, got a revision of roster 2:30 mins before the scheduled departure that my weekly rest was insufficient at 0230 am for 5 am reporting. Horrible work conditions!
6. Fatigue is subjective. It could be mental, emotional or physical. And it is also that some reasons for fatigue may be due to prevailing conditions. So it may be a factor one day and not on another. Emotional and social factors are completely overlooked in fatigue management by airlines due to commercial constraints. Those have to be brought to the fore.
7. FRMS is a futile exercise with poor outcomes as pilots are scared to report fatigue to management due fear of reprisals. As a Management Pilot in Vistara, I have seen crew schedulers threaten pilots with termination if a flight was to get cancelled due to last minute disruptions. FDTL CAR is not scientifically designed.
8. Don’t treat pilots like robots
9. The prevailing rostering practise in India is to plan pilots daily duties to the limit of the FDTL. It is causing major burnout, premature medical unfitness and loss of talent to the ME and international carriers.
10. Fear of DGCA grounding unreasonably
11. We are waiting for a disaster to happen, increased RA’s, increased unstab approaches, increased ground incidents are reflection of a punishing FDTL scheme and cost cutting in training . Legal support for pilots is zero in case one has to fight back. Contracts which are one sided and a shame to slavery that existed centuries ago. Reforms are the need of the hour.
12. Scientific studies should be done and reports made available to public on effects of long duty periods and consecutive night operations on fatigue, circadian disruption, hormonal imbalances and mental health of crew.

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13. Multiplier effect of gaps during tail swaps at airport lounges, and the fatiguing effect of lugging layover bags up and down narrow, rickety aerobridge steps. Layover + tail swap + lounge/aerobridge steps + additional transit (pointless) security = fatigue
14. Company trying to trick pilots by taking approval of company ops manual and following ops manual. Roster are legal but inhuman to an extent that it doesn't not allow to manage sleep properly No work life balance
15. Too many layovers, pilots come home for just 1 day after working layover flights for 6/7 days . Base does not matter anymore
16. Constantly changing Rosters and low quality of Layover Hotels and less support from the company for reporting fatigue. All are main causes Fatigue and stress.
17. Efficiency of the regulator plays a vital role,specifically DGCA is incompetent as they are hand in glove with the operators.
18. Deep influence with 2 to 3 hrs of transit time
19. All covered in detail
20. sleep is at premium with frequent early mng dep, tail swaps with wait between flights add to fatigue
21. Fatigue is real. I hope the regulator and the airlines understand the same and work towards solving this major problem.
22. Fear of being dealt in an unjust manner for anything and everything.
23. Cumulative fatigue mitigation after a series of Ultra Long Haul flights not possible with this FDTL as 120 hours of rest is not enough for extreme geographical/time zone disruptions. Early morning dead heading to operate ULR flights the next early morning is tiring. Difficult to coordinate/decide inflight sleep schedule on ULR flights without a system to communicate with other crew members prior to a flight Fatigue and irritability affects family and social life
24. Terrible Management
25. Manobalan

26. Unnecessary too many questions for this survey.
27. Dgca has failed everyone by not implementing latest CAR
28. I do hope my 5 mins towards this Survery is being used for the welfare of the community & not finding another loophole to disregard the significant toll this flying profession takes on an individual's mind & body.
29. On paper vs the ground reality is very different
30. The proposed FDTL CAR revision of 2024 was a much needed change. It has to be implemented at the earliest. It will help mitigate a lot of risk factors.
31. Please implement the new CAR at the earliest
32. Logbooks
33. Continuous changes to the roster without the requirement of crew acknowledgment, duty periods planned through the entire circardian low to the limit of FDP and added training on these same flights causes fatigue and is detrimental to flight safety.
34. Work environment is toxic and not fair . One way street by employer with no say or representation for employee
35. There is no Transparency, Fairness, stability, Accountability in the Rostering system which affects the daily life health and work balance.
36. It's discouraging to see a better duty time being curtailed right before it was to be implemented.
37. No
38. Airline pressure and fear of vindictiveness if fatiguing schedules are refused/challenged and/or FDTL extension consent not given. Plain and simple FDTL limits are treated as the minimum rule instead of being the maximum rule. Regulator doesn't have mechanism so that FDTL/schedule manipulation can be reported anonymously and/or regulator scrutinises each flight irrespective of any reporting done. Even after disastrous accidents, regulator investigation and recommendations and corrective actions are only pilot centric instead of any corrective actions against all other contributing or main reasons. All these contribute and multiply the pressures and fatigue where even regulator is significantly responsible.
39. FDTL CAR has to be pilot friendly, should be made with thorough research done on Human Factors , Circadian Disturbance, Environmental for eg. polar operation for which there is no research done in Indian Aviation. Adequate Rest post & pre ULH operation for FDP of >22hr. Definition of Posting has to be clearly defined. And Most

importantly since it has Safety Involved, it should not be Favouring Airline but be Pro Pilots.
40. INDIAN AVIATION HEADING FOR DISASTER DUE CREW FATIGUE
41. Due consideration to the FDTL in India for safety and long term impact to the health of pilots.
42. Leaves are absolutely necessary for physical and mental recovery but are not granted by the company and instead accumulated. Roster stability is not adhered to and causes significant disruption to a crews work life balance with negative effects.
43. Minimum rest, long duties, long commute to and from work, tail swaps, relying purely on Boeing Awareness Model to consider fatigue, ending last duty day close to midnight before weekly rest, and ending weekly rest with early morning departure are all brutal factors and will lead to something unfortunate some day.
44. The DGCA CAR doesn't take into account the fatigue induced by transport time, or lack of adherence to published roster.
45. Multiple sector, Maximum duty, Minimum rest, Aircraft and Terminal swap are major contributing factor to FATIGUE.
46. The regulator should do this survey. If not, it should be handed over to professional survey agencies. All pilots involved in active flying should be asked to do the survey via EGCA. It should bea non punitive, court monitored survey.
47. FDTL by definition lays out limits. Using these limits as a scheduling guide erodes flight safety margins. This is very dangerous as it leads to cumulative fatigue with no respite.
48. Roster stability with min stby days should be there, FDTL should not be used as a yardstick/norm to stay within but should be reached seldom
49. Long duty periods, specially during pre monsoons and monsoon. Regular changes in planned schedule, Regular rail swaps and airport halts with no adequate rest area, Calls and emails from company during rest periods, insufficient transport time.
50. Managements tend to manipulate FDTL regulations to exploit the very essence of it. No regulation regarding stability of roster and number of changes allowed on the roster gives them an opportunity to change the roster with free will. In terms of long haul operations even if 1 flight is changes per month the entire personal monthly schedule of the crew is disturbed putting a lot of stress to manage their personal life. Contracts being offered are based on lesser flying hours which forces pilots to undertake these changes which otherwise will hurt their earnings many times leading to pilots flying even when not physically fit to do so or not rested.Many interact clauses of consequences for not accepting these changes in the contract create fearful work environment. Simulator duties before flight are clubbed in the

same duty period without giving any due to the mind frame after a Simulator session of the pilot.Varios other non flying online work , forms courses etc are signed to crew to complete in the time meant for them to recuperate and spend time with family with harsh consequences for not completing them on time.DGCA minimums (transport times/ post flight duty allowances) are a part of the roster policy despite the regulations recommendations of not doing so.Actual times of these are not taken into account when adhering to the FDTL.
51. Work life balance , maintaining roster when published , leaves to be granted .
52. Every “through the night” flight requires two nights to recover. Two consecutive nights is killing.
53. Thanks for the survey. Need of the hour is to review FDTL towards reducing duty period by at least 25% and weekly and monthly flight duty by 10 & 20 hours respectively. Also, any change to printed roster must not b changed without consent.
54. Wilful violations, misinterpretation of FDTL CAR by CMS for commercial gains, unethical rostering practices major cause of fatigue.
55. Support from company for the wrong blames and steady regular schedule with work life balance can be maintained will really help. Good Accomodation with food around is the need.
56. VERY UNSUPPORTIVE AND POOR WORK ENVIRONMENT
57. No increment in salaries due cartelisation by Indian Airlines and notice period causing lot of financial stress.
58. Two Consecutive nights should be prohibited completely as they have a major impact on the sleep patterns and mental stability of the crew...and hence the safety of the Pax
59. Over the years the duty period increased and quality time away has drastically changed and deteriorated. I have found myself to be less than optimal on several occasions in flight.
60. Sub standard salary also creates a lot of mental stress
61. Even when the period of a night flight is defined as 00.00 to 05.00 for calculation of night flying. To report for a duty starting at 5.00 we still need to wake up at 3.00 which is in the WOCL period but never counted as a night flight / alternatively when landing by 23.55 with post flight duties and transport time the pilot ends up sleeping only by 02.00 am which again is never counted as part of wocl . The period of night flying needs to be counted as 23.00 to 07.00 for us to practically get proper night sleep and avoid continuous early morning & late night finishes using the loop hole above. Airlines shouldn’t be allowed to call in the 8.00 hours preceeding a stby to allow for

proper rest in the night. They should be calling at the start of Standby for intimation. Any and all changes to patterns should be intimated atleasy 24hours prior and not with 12 hours notice. We have personal lives too and house errands and family time that is never catered for . Most of our time is spent on layovers and out of the house.
62. Time pressure , 4 sector and back to back mix of day and night duty should be taken off
63. My company cuts costs in terms of crew meals. Despite raising it to the management multiple times, nothing has been done. Had recently diverted and there was no food.
64. Flying got extremely fatigue causing flying 4 sectors at minimum rest with tail seap and halt.to be honest safety has taken a last seat in indigo.making profit is on first seat which is extremely alarming and unsafe.as pilots cant even voice it because openly management says that regulator is in their pocket.they can do anything
65. Consecutive midnight are killers. Minimum rest is a guideline by administrator, it should not be used as planning tool. Tail swaps should be reduced.
66. Awaiting a considerate and unbiased regulation by the Regulator and the Company
67. DGCA fdtl
68. Nil
69. No swaps of flight possible due too many errors. Crew scheduling doesn't entertain any of your personal requests
70. misuse of night definition by airlines. one day reporting before 0500 next day 0505 it's not consecutive night but fatigue is same due loss of sleep
71. New FDTL should be implemented as soon as possible. We all waiting for some catastrophic to be happen with this current FDTL.
72. We should respect our biological nature and sleep at night. Studies have proven that staying awake all night leads to devastating health conditions. We must learn from Hong Kong and other countries where labour laws don't permit night work.
73. The current car is toothless , with the iata / icao conference scheduled in India for next year , no government will want to touch their golden goose I.e. current trajectory of the industry. I don't see any changes forthcoming. Sad but true, a few more heart attacks and it'll die down again. Thank you for the top work you are putting in Sir.
74. Need urgent change in FDTL.

75. Consecutive Midnights should be followed by adequate (longer) rest for body & mind to recover for normal duty hours.
76. While an average office staff works for 9 hrs a day for 5/6 max days in a week. It is shocking a pilots duty limit can extend to 13hrs in a day and for even 7 to 8 days of continuous work without rest. A real sad state of affairs.
77. Constant schedule changes without consent,minimal Offs during a calendar month. Extremly stressful on personal and professional well being and mental health
78. nil
79. Crew Rostering systems and airline never treat us like human beings. We have duties at home as well we can not rest properly when we are scheduled for back to back flights. This hampers our mental peace as well as physical well being resulting in sacrificing safety.
80. FDTL RULES NEED TO BE MORE INCLUSIVE
81. Consecutive night should be reconsidered
82. These bad policy are , just like time BOOM, Let airline enjoy these along with government agencies But if these bad ,unethical and inhumane partices continuous the aviation industry will suffer badly.
83. The main causal factor for the ever increasing fatigue is the regulator who facilitates all the root causes for fatigue to exist (and in turn gets felicitated by operators for the same). The regulator is hand in glove with the operator for each and every letter imposed as a rule and executes whatever the operator instructs without having a mind of their own to take decisions. And to add the last, the regulator is, was and always will be deaf, mute and blind to the voices and plights of the end of the line people (Pilots, Engineers, Cabin Crew) who actually do all the work.
84. Alternating day and night and minimum rest are major contributors towards fatigue
85. Night simulators only for tri,s in Indigo
86. The proposed DGCA CAR may be implemented at the earliest.
87. Midnight duties creating huge impact on rest. Especially consecutive midnights
88. The new fdtl should be enforced asap.
89. FDTL needs revision to improve the work life balance which will improve the overall safety in all respects.
90. Indian skies have become very chaotic, really had to work on myself as started feeling hypertensive over a period of time. Change can only happen when airlines

treat us as an asset over just being an employee number. Hefty bonds also make one feel trapped and even if we choose to take a break, one really can't.
91. The new FDTL CAR could help mitigate fatigue to an extent.
92. OTP and conflicts with ground departments for multiple back to back sectors, combined with roster disruptions due weather, makes it very tiring
93. Horrible personal in the rostering team who treat us worse than animals with full support from management
94. FDTL is fundamental for Flight Safety.
95. DGCA is not looking out for aircrew / public interest and that's the reason the new CAR has been shelved
96. Pay! And getting under paid for all this hard work is unacceptable. 40hr pay was introduced in 2020 during covid. Why are the companies still keeping it? Whereas wold Over companies are giving several months of profit share.2020 Jan SFO in Tata group airlines was getting paid 4.75L, its 2024 and they are paying 3.35! Correct it for inflation its just peanuts.
97. Single OFF just doesn't suffice.
98. Demotivation due to non implementation of new FDTL
99. Fatigue levels has gone up drastically in past 3-4 yrs post COVID. Its just unsustainable.
100. Increase rest for pilots, current FDTL is killing
101. Not having stable rosters and last minute changes contributes to the most stress and fatigue
102. Insecurity due major repercussions to small unintentional errors.
103. Nil
104. Frequent duty changes at less than 48 hours notice lead to being unable to plan our rest. Lost halts and tail swaps during a flight duty period lead to walking with heavy bags in airports shuffling around which becomes quite tiring. Frequents halts mean switching on and off multiple times during a duty, and each time you switch back on to a high alertness state it becomes much harder during the

day. It's easier to operate 4 sectors over 6 hours of duty than 2 sectors with a gap of 3 hours between them in an 8 hour duty.
105. using our mandatory off to accommodate post flight and pre flight rest and even CL and PLs has profound negative effect on the personal lives. On my mandatory off I am generally recovering from post flight fatigue. Meeting family commitments gets very difficult.
106. Dgca should treat pilots as human beings not as machines
107. The rosters are planned ending close to midnight before the offs it leave and an early morning red eye flight immediately after OFF / leave days.
108. Air India Express Connect(Air Asia India)
109. Few options should have 'none' as a choice as some questions don't affect widebody ops. A new Boeing FTD is locking the P1 seat in almost upright position. For two crew ops, it is significantly adding to the fatigue during the flight due to uncomfortable position to carry out In-flight Rest as mandated by the dgca ops circular.
110. Nil
111. Delayed Flight & Need to maintain OTP- Rushed documentation with hardly any checks carried out,Bullying attitude of crew scheduling to keep changing assignment or manipulate foreign assignment, Management Pilots leaving flights in WOCL & taking good international layovers & day return flights,
112. Airlines now make use of the consecutive midnight rule to cut rest on international layovers and plan late night arrival followed by extremely early morning departures. This is insane. Cost cutting by Making use of consecutive midnight at the cost of health and mental peace of pilots. Landing at 2am and reporting at 3am next day is standard for all middle east flights
113. Na
114. Shorter international layover durations
115. Uncertainty of work and life balance. Flight stress and medicals haunting licence. Dead heading before and after flight duty. Big airports with cisf restrictions on crew movement.
116. Please follow internationally accepted norms in "LETTER & SPIRIT"
117. Inflation, nill or insufficient salary increments, same allowances as they were 16 years back.

118. The FDTL set by the regulator is the absolute limits, catering for days where delays or diversions happen. Whereas airlines plan it to almost max FDTL in the roster preparation stage and combine fatigue factors such as 4 sectors, Tail swap, waiting time at airports, consecutive early morning flights, international to domestic terminal transfers, crew change etc which add to fatigue and pave way for unsafe operations. No use filing Fatigue forms as it's either ignored or minor changes take place which are temporary and 3 months later again the same fatiguing patterns are back because they are "legal"
119. We are not going to be fit for anything in a few years. Health has deteriorated
120. FDTL has no provision to monitor ground training duties you can go 5 days through the night and still do two consecutive night flights
121. FDTL limits are outer limits and should be treated as such. But Indigo treats these as targets. Also violates the CAR and penalises pilots for reporting fatigue.
122. No
123. Frequent roster changes n forced to accept it, fatigue converted to sick, consecutive night flight, early morning flight, scheduling call at mid night and flight with minimum rest all these r overlooked.
124. Alot of 4sectors flights consecutive noght flights leading to mental fatigue, stress
125. Fatigue is very real. Don't let anybody fool you that you can power through it.
126. Consecutive night flight with min rest and long travel time to hotel. Pressure from company to extend fdtl.
127. NIL
128. Need for filing reports, EFB sector log, FATIGUE REPORTING PROCESS & POLICIES
129. Salaries being paid on time and being transparent with the pay structure also adds to the stress
130. Not complying with the roster flight and calling up and changing flights on a every day basis.
131. Dgca limits are minimum whereas airlines use it as maximum and always plan around the edge, with a usual answer to any query "you're legal" or "within fdtl" lastly some company document made without dgca approval and used that to exploit fdtl with own interpretations in that book!
132. No

133. The overarching problem is that even though crew scheduling in most LCCs like AIXL and SpiceJet among others is that even though the roster may be published for a month. It is rarely followed. Last month I had pullouts every day which completely unbalanced my sleep cycles, personal well-being and family relationships. This is attributable not to a shortage of pilots but to a complete lack of foresight and planning among the higher ups. Crew Scheduling has been given carte blanche as far as the schedule is concerned. DGCA turns their back on pilot fatigue and takes an excessively hard line on any oversight by pilots in the line of duty while encouraging the airline management to act as they please by turning a blind eye to the plight of pilots. All the concerns mentioned in this survey are genuine and need to be addressed urgently to prevent a sharp upturn in fatigue related incidents.
134. PROBLEM IS ROSTERING THEY ARE GIVING DUTIES IN PLANNING WITH KINIMUM REST FOLLOWED BY 4 TO 5 DAYS OFF IN A MONTH, NO REST ALL FLIGHTS ARE MINIMUM REST ALL LAYOVERS MINIMUM REST, MULTIPLE CHANGES BY ROSTERING, NO ONE LISTEN NOT EVEN OUR MANAGEMENT AS THEY ARE NOT FLYING AS THEY ARE JUST ENJOYING , day by day pathetic condition, pressure of work always.
135. Uncertainty combined with lack of empathy from management esp rostering plays havoc .
136. Tran8ng on top of all this contributes more on fatigue levels
137. Better Roster management needed. Also, need the new FDTL scheme to be implemented which is put on hold by DGCA. Commercial gains should be pursued, but, with safety at the core of the operations, which means fresh and alert set of crew at the controls. Also, family and social engagements should be given enough weightage in the Rostering policies made by Airlines. With such demanding schedules, no other workforce with such demanding work profile works for 168 hours consecutively before they get their weekly rest. Weekly rest should be given at least every 144 hours. Also, with raising traffic and demanding schedules crew mental health should also be given enough weightage. With weather and other environmental factors reaching extremes like never before, crew should not be burdened with technical issues , like good weather radars
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139. Please do something for the pilots. We are helpless, struggling to live a normal life . All because of FDTL and bad work ethics
140. None.
141. Current DGCA restrictions/regulations need to be backed by scientific data. The heads of DTL are not pilots. The FSD team is a pool of pilots who prefer desk job to cockpit, therefore prefer to pass the buck- can't take a stand. Attempts are being made to facilitate the company, but this should not be at the cost of safety considerations. Base audit are at times stage managed to regularise misdeeds. This vicious cycle if not broken, sensible FDTL rules which is at par with other nations can not happen.
142. Roster disruption and regular minimum rest flying are the most significant factors which lead to fatigue.
143. Thank you
144. There needs to be system wherein the committee deciding upon the FDTL regulations comprises of atleast 30% Aviation Medical Specialist Doctors from the IAF (Coz they're the ones scrutinising us during renewal medicals) + 30% Normal Line pilots preferably with seniority of 10+ years (coz the management pilots don't fly as much and hence loose touch of travails faced by regular Line pilots)
145. Most significant factor that causes fatigue is lack of a fixed sleep schedule, operating through the night for a couple of days and then getting an afternoon reporting. It gets difficult to force yourself to fall asleep while your body has been working through the night past couple of of days.
146. As we progress, the airlines will squeeze more juice out of pilots. There is no logical or technical analysis done to cater for pilots needs. With the amended FDTL CAR in not being implemented, DGCA has proved that it works for commercial interests. For airlines Crew are just a number to fill the open flights.
147. 1. Roster should be released for the month as a mandate and the release date should be atleast one week prior to new roster. Same needs to be mandated by DGCA and enforced. 2. Crew minimum accomodation standards need to be fixed. 3. Crew shortage needs to be addressed by encouraging and facilitating Indian crew upgrades and career growth rather than using expats as an easy fall back mechanism.
148. This type of flying and scheduling problems are found abroad also.....CAA colluding with the airline is the norm. Pilot's are treated like machines & not like human beings

149.	Enough rest should be provided after consecutive night flights
150.	It's covered all I could imagine. Thankyou
151.	Frequent roster changes without crew consent and single weekly off significantly hampers quality of life thereby increasing stress and fatigue and leading to lack of interest in what we enjoyed once that's flying.
152.	I am a pilot with 28 years of Military and 5 years of Commercial flying experience.
153.	No central organisation to take up our many grievances. Management becoming more and more dictatorial and arrogant. No work life balance whatsoever. Salary remains stagnant. Deferring of new FDTL is very demotivating . Govt & courts entirely uncaring about us , our service conditions and pilot and passenger safety . Overall a very bleak scenario for Indian pilots . Not a profession to get into any longer.
154.	Most paramount is airlines utilising maximum duty time for crew
155.	Change in FDTL is required
156.	Pilots also need 2 DAYS WEEKLY OFF as in all other sectors... Flight Duty time must be increased, and calculated from "Pilots Wake up from Flight" till he/she reaches at "Home/Hotel + 1 hour"
157.	Too many information / mails / ground subject related lengthy and continued Cources/ too frequent updates & too many circulars / notices lead to information paralysis, which itself is cause of deep influence.
158.	Answers based on Indigo schedule on A320
159.	Remove consecutive night operations and reduce maximum flight hours to 7 hrs and FDP 10 hrs with maximum 3 landings
160.	The human factor is been taken out of windows.If im up one entire night and next day waking up early morning even Delays due to varied reasons either weather,crew connections causes more tiredness.Unrealistic travel time to and fro home/ hotels cut ups on rest time
161.	Minimum rest required to be given to be in compliant with FDTL CAR should also be restricted to only TWICE a month! Humans can not work consistently on MINIUMUM REST forever..
162.	Change the current fdtl

163. The abuse of FDTL CAR minimum rest and consecutive night flights by the major airline rostering has been significantly affecting crews health and overall safety of the flights.
164. The present FDTL is criminal and it compromises the safety
165. Two Consecutive days and nights are killing us. It's slow poison given by Presesent govt, Civil aviation ministry and DGCA. FDP 13 hours. Safety always compromised.
166. Operations on two consecutive nights and a rest of 2-3 hours during flights cause maximum fatigue.
167. Issues raised but management acts with deaf ears , all airlines in same boat to save money for them as we pilots are replaceable easily
168. Plan a shorter survey , so that more pilots are encouraged to do it
169. Na
170. No
171. Rest time is minimum. Unable to recover from fatigue and keep adding. I did continuous 6 days of work with each day I had minimum 15 hours of rest
172. Good morning Sir, thank you. Since 2018 I have emailed for Feedback comments asked for scientific study appraoch to it. Thank you for taking this forward. Regards
173. Too many changes in schedule
174. Chief pilots should work as an independent employee, so long as they remain under the payroll of the company and under ops and management influence, they won't be able to truly represent and protect their pilots from unfair, unethical and unscrupulous practices of the corporate world.
175. Instability of rosters and indifferent management make it feel like we have no worth. We are just a number and safety is just a tagline
176. Corrupt Conpany Management, non payment of salaries and defiant government /regulatory authority are the biggest factors of stress, fatigue and flight safety incident/accidents.
177. Travel time between place of residence to airport & back. Travel time between dispatch to aircraft also needs to be catered. SOD travel landing post midnight not catered towards consecutive nights, which is incorrect.

10. QUESTIONNAIRE

Adobe Acrobat Document

List of questions in the survey

Nature of flight operation

Personal information

Indicate your age range

Marital Status

Number of children

Nature of Flying

Working status

Weather, air flow and other environmental disturbances

Risks posed by passengers

By technology, failure and other risks

A (temporary) adjustment of the flight schedule

Poor support at work

Internal conflict among the crew

Problems with people on the ground

Reporting fatigue and the fear of adverse reaction

Working conditions

Noise, temperature, air quality, etc

Seated in fixed position/confined space while flying

Work pace, time pressure

The work rhythm is interrupted

Busy airport, etc

Repeatability of work

social duty and pressure

Constraints on flight schedules

Eating quality and time available to consume the meal

Accommodation/rest conditions

Commercial operational pressure

A condition requiring supervision or control

Work load

How mentally demanding was the flight?

How physically demanding was the flight?

How rushed were you to complete each step of the flight?

How hard have you worked to get to where you are?

How insecure, discouraged, irritable, stressed and annoyed are you?

Work schedules

Multiple Sector Flights (>2 landings in a duty period)

More than 10 hours on flight duty period

Consecutive night flights

Switching between day and night flight without intervening rest day

Frequent Changes in Schedule

Increasing flight duty period/landings towards end of series of flights

Frequent tail swaps within one duty cycle

Flights with minimum rest period as given in the DGCA, CAR without buffers

CIN: U85300HR2021NPL096553

Travel time to and from Home/Hotel

Giving discretion over the flight duty period to complete the flight

Average number of landings per flight duty period

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