



IMPACTS OF 'WORK FROM HOME' MODEL ON HUMAN HEALTH

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Abstract

The coronavirus (COVID-19) pandemic has rendered a large proportion of the workforce unable to commute to work, to mitigate the spread of the virus. This has induced a shift in the working arrangements of millions of employees to Work-from-Home (WFH). The aim of this study was to evaluate the impacts of WFH on holistic health of workers and analyze the significant stressors among each category of social, mental and physical well-being. Approximately 30% participants reported substantial continuity of WFH considering the physical-mental issues, whereas more than 50% preferred WFH considering social-impacts. Subjective responses from two online surveys were analyzed to understand factors associated with holistic health. Vulnerable population was identified under each human-variable. While some unhealthful behaviors appeared to have been aggravated, other more healthful behaviors also emerged. Due to the flexibilities offered, it is possible that WFH may continue to some degree in future. To make this arrangement feasible and contribute effectively towards productive work, organizations will require to implement formalized decisions on continuity of WFH model based on the individual impact analysis considering demographic and professional variables of different workers. Based on the study recommendations have been made for longitudinal studies to investigate the dynamics of remote-work.

Keywords

COVID-19, Physical and mental Health, Social Health, Work from Home (WFH), Impacts, Demographics, Occupations.

INTRODUCTION

COVID 19, a global pandemic caused by a highly infectious virus – corona virus resulted in unprecedented fatalities. The World Health Organization (WHO) laid guidelines to adopt strict measures in the form of nationwide lockdowns, social distancing, and restriction on movements to combat the disease. To comply with these guidelines and to avoid economic run-down, as a consequence of this companies, organizations and institutions revolutionized the prevailing work arrangements and the concept of 'Work from Home' (WFH) emerged. "WFH is a shared working arrangement in which a worker fulfils the essential responsibilities of his/her job while remaining at home, using information and communications technology (ICT) and in turn the employer ensures business continuity and employment" (ILO, 2020). Due to restrictions on anthropogenic activities like industrial projects, vehicular movement, construction

projects, tourism and other common transportation activities, the world witnessed a 'never before' stagnant phase.

According to the Central Pollution Control Board (CPCB), Air Quality Index (AQI) is a tool to measure the level of seven air pollutants (PM_{2.5}, PM₁₀, CO, NH₃, NO₂, SO₂ and Ozone) by transforming the weighted values into a single number (CPCB, 2020). Metro-cities not only reported improvement in AQI, but also demonstrated a decline in adverse health effects due to reduction in air pollutants including aerosols that cause premature mortality through lung cancers, respiratory illness, breathing discomfort and cardiopulmonary diseases (Partanen, Jean, & Matthews, 2018). Reduction in dumping of industrial effluents enhanced the self-cleansing capacity of the Indian rivers. Reports claim 40-50% improvement in water quality of the river Ganga with

Biochemical Oxygen Demands (BOD) levels below 3ppm, Dissolved Oxygen (DO) levels above 8 ppm, making it fit for drinking standards(South Asia Network on Dams, 2020). Due to restricted human interaction with nature in a country like India, WFH proved to be a blessing for the environment, resulting in flourishing of flora, fauna and human-health.

WFH curtails frequent commute time, enhances flexibility and permits working population to work when they are most productive. It also offers workers to get more time to take care of their families and fulfill their responsibilities. (International Labor Organization). But along with the benefits of WFH, negative impacts on

physical, mental and social health follow(Xiao, et al., 2021) (Oakman, et al., 2020) (Eddy, 2021).Thus WFH model impacts holistic health of humans. This study was taken up to explore the impact of WFH on various health aspects among people of varied age-groups, different gender, varied work profiles and different family background. The specific objectives of this study are:

- To identify the type of jobs suitable for working from home.
- To predict the scope of WFH considering each aspect of holistic health individually.

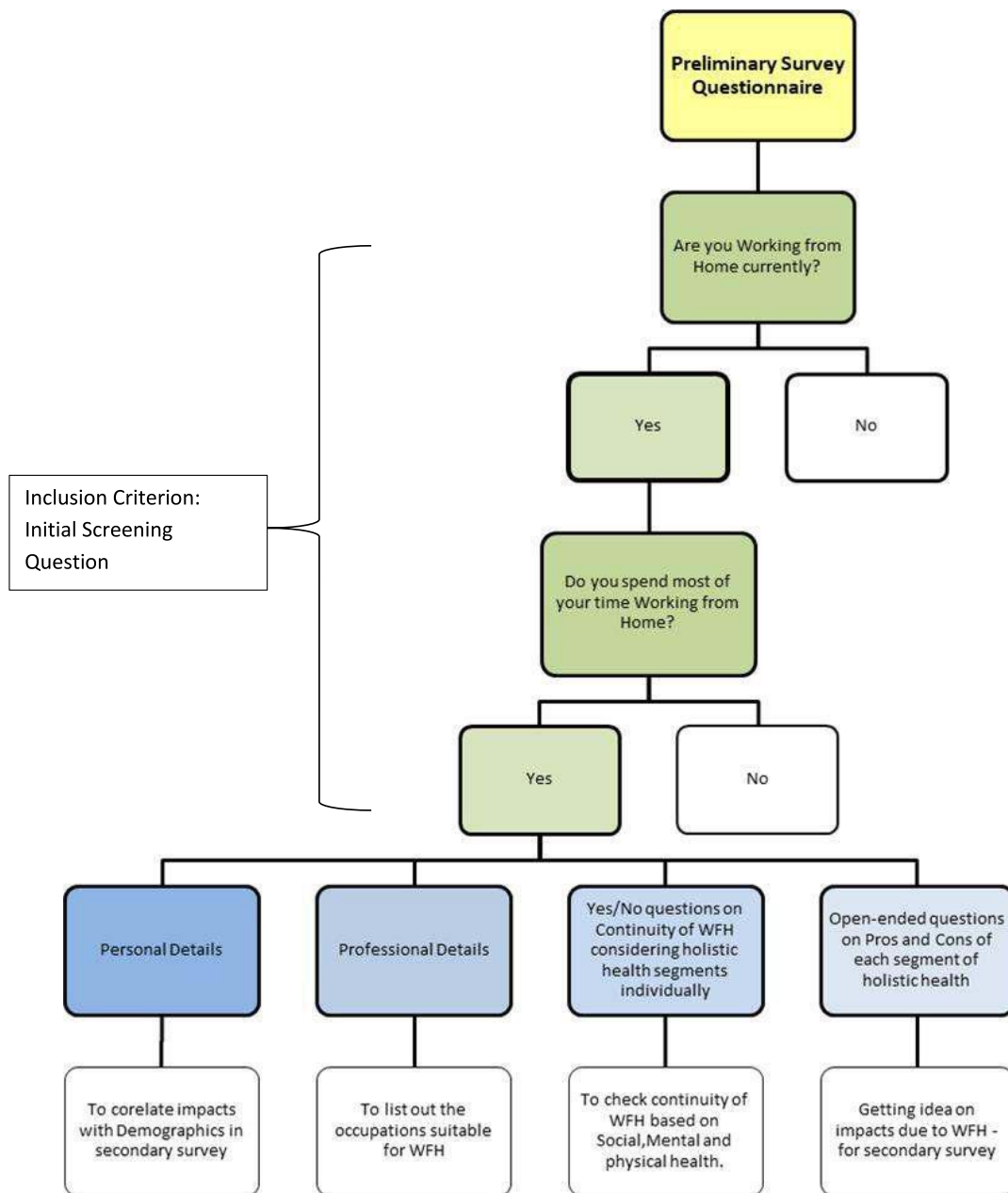


Figure 1: Flowchart of the Preliminary Survey.

- To quantify the intensity factors of all impacts and analyze the human variables potentially affected by each impact.
- To suggest the feasibility of WFH model within the Indian work culture based on the study.

Methodology

A descriptive study was carried out from December 2020 to May 2021. Data was collected through two online structured survey questionnaires– Preliminary and secondary surveys using Google forms. The aim of the former survey was to evaluate feasibility of WFH considering all segments of holistic health individually, while the purpose of latter study was to conduct a subjective impact analysis to understand effects of WFH on people with varied work-profiles and demographics.

Preliminary Survey: Introductory analysis

A structured google form was prepared. To attain maximum responses, the link for former survey was circulated through emails, social media platforms and call requests. 1572 responses were received from preliminary survey. 92 forms were eliminated that did not meet inclusion criterion of spending most of time working. A total of 1480 valid responses were evaluated for the study. The first part of the questionnaire included mandatory questions on professional details to be filled by the participants, responses of which resulted in list of occupations that are suitable to incorporate WFH model into its work culture. The second part included yes/no type mandatory questions on socio-economic, physical and mental aspects for continuing WFH, each attached with an optional blank to justify corresponding answer stating pros or cons. The flowchart of the preliminary survey is given in Figure 1.

Secondary Survey: Descriptive Analysis

Analyzing the characteristics of participants of primary survey, sampling was done to get responses for understanding the correlation between WFH impacts and demographic, socio-economic and professional variables of shortlisted respondents from primary survey. The aim of the secondary survey was to propose a feasible WFH model for future considering impact on each human variable. The link for secondary survey was recirculated among those participants through emails and social media. To ensure unbiased analysis, from the received responses, a mixed bag of 100 ideal participants was chosen as the sample size for descriptive survey using SQL Database software. The flowchart of the descriptive survey and secondary survey is given in Figure 2 and Figure 3.

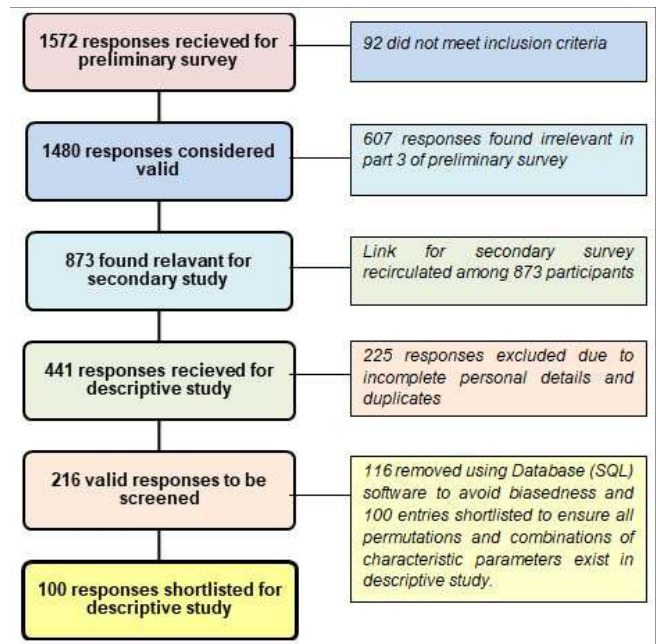


Figure 2: Flowchart of sample-size for descriptive survey.

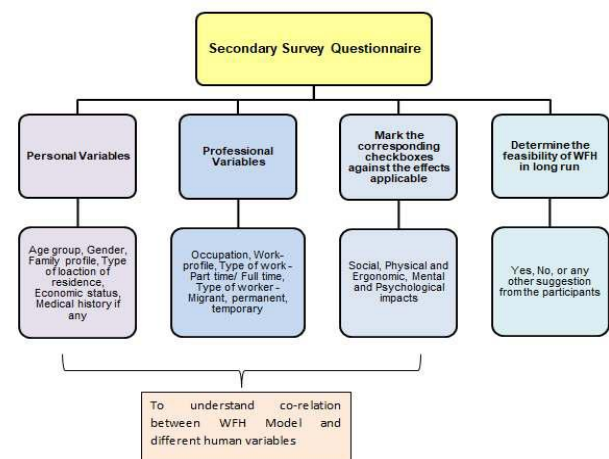


Figure 3: Flowchart of Secondary Survey.

Initial part of secondary survey included mentioning personal and professional details. The next section included Multiple-choice-Questions on social, mental and physical aspects of WFH, where participants were supposed to tick-mark all those checkboxes applicable, against the listed pros-cons within each category of holistic health. The last open-ended question in both surveys helped in determining feasibility of WFH in the future of work culture. The questionnaire was reviewed and approved by a senior professor of Health and Environmental science.

RESULTS

Outcomes of Primary Survey Work profiles suitable for WFH

From the responses of introductory survey, we got a list of professions that can incorporate online mode of remote work.

The occupations suitable with WFH are broadly classified and given in Figure 4.

Sr.No.	Work profiles suitable for WFH
1	Business, creatives and legal professionals
2	Engineering and Architecture, Technicians
3	Education and Arts
4	Healthcare and social services
5	Computer science, Basic science and research
6	Service sector and physical occupations

Figure 4: Occupations suitable for 'Working from home'

Responses to scope of WFH with respect to individual aspect of holistic health

From the primary survey, majority of the people preferred WFH option in view of the economic (60%) and social (51%) impacts, whereas several respondents stated refusal on continuity of WFH considering physical (66%) and psychological (70%) impacts (Figure 5).

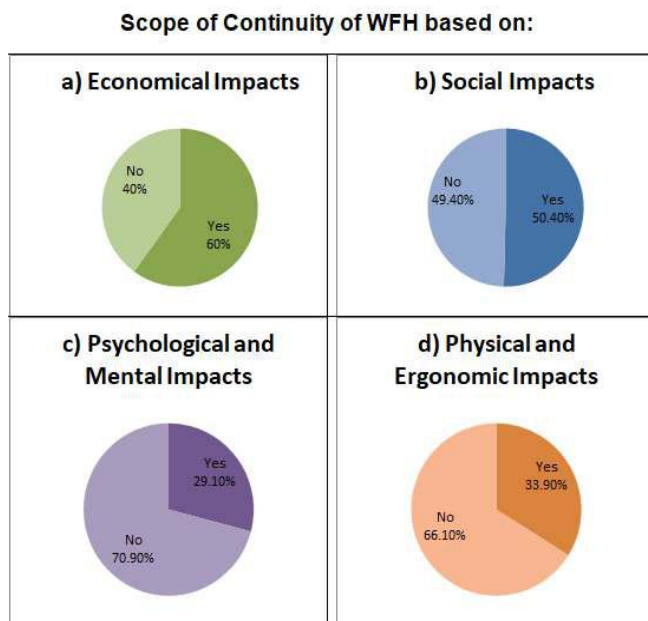


Figure 5: Evaluating the scope of WFH in the long run considering Economic, Social, Psychological and Physical aspects.

Outcomes of Secondary Survey

Characteristics of Participants of Secondary survey

Impacts on Holistic health due to WFH are subjective. Hence an even distribution of occupations among the survey participants was ensured to avoid bias and understand the correlation between people with different demographics, different work culture and their respective views on impacts of WFH. Demographics broadly included personal details

like gender and age-group as well as socio-economic background of participants (Figure 6). Professional details encompassed current work-profile and history (Figure 7)

Responses of secondary survey

All factors of social, mental and physical impacts were quantified with secondary survey. The graphical representations are presented in Figure 8, Figure 9 and Figure 10.

Major stressors of social impacts include problem in Work-life balance(43%) and communication issues (34%), while potential enablers include family reunion (58%) (Figure 8).

More than half(55%) of the respondents experienced laziness and irregular routine during WFH. As per the respondents, sleep disorders(37%) and stress(31%) add up further to the mental and psychological impacts. Though fewer participants reported problems such as anxiety(22%) and depression(20%), they are potentially detrimental psychological impacts (Figure 9).

More than 50% reported weight gain and strain in eyes under the physical impacts category. Musculoskeletal issues such as back pain (47%), neck pain (33%), and wrist pain (12%) add up for the ergonomic impacts. Increased screen time leads to visual symptoms including dark circles (35%) and headache (36%). Nearly one-third participants claim improvement in physical health due to home-made food (Figure 10).

Feasibility of WFH in the future of Work culture

Combining the outcomes of both the introductory and analytical survey, nearly one-third of participants suggest a strong negation for the proposal of WFH being a New-normal in future. Two-thirds of respondents want WFH model to be permanently incorporated into the future work culture. Approximately 40% demand hybrid work culture in future with conditional continuity of WFH and going to workplace only whenever required (Figure 11).

Responses from surveys depict a surge in number of holistic-health issues post transition to WFH. Summary of meta-analysis demonstrates the category of variables more affected, corresponding to each impact (Figure 12).

From the Kiwiat diagram (Figure 13), prominent conclusion can be drawn that working-females report more health issues than males, and hence are more vulnerable for health impacts of WFH.

Radar plot of Figure 14 represents the workers' population having significant health impacts due to WFH. People of age-groups 40-60 years are more susceptible to the impacts of WFH than the young.

Results from Kiwiat-diagram state that employees belonging to Joint-families report more health issues than those from

Demographics of Participants																		
Gender		Age Group				Type of Location of residence			Family size		Participants having Children		Economic Status					
Male	Female	20-30	30-40	40-50	50-60	Rural	Suburban	Urban	Nuclear (4 members or less)	Joint (more than 4 members)	Infants / kids	Teens	Poor (<2.5 LPA)	Lower income (2.5 - 5 LPA)	Middle class (5 - 10 LPA)	Upper middle class (10 - 50 LPA)	High income (>50 LPA)	
50	50	25	30	30	15	14	31	55	52	48	37	49	6	17	30	29	18	
Total Participants : 100																		

Figure 6: Demographics distribution of 100 participants.

Professional Details of Participants													
Occupation						Type of Work		Type of worker			Prior WFH experience		
Business, Creatives and Legal Professionals	Engineering and Architecture, Technicians	Education and arts	Healthcare and Social services	Computer science, basic science and research	Service sector and Physical occupations	Full-time (6 to 8 hours or more)	Part time (less than 6 hours)	Permanent	Temporary or contract basis	Migrant workers (Working in other city or area)	Yes	No	
11	26	18	14	20	11	73	27	67	24	19	11	89	
Total Participants : 100													

Figure 7: Work profile distribution of participants of secondary survey.

nuclear families (Figure 15). In contrast, those having children above 13 years are less vulnerable from the impacts of WFH than those having infants.

From the radar-chart, it can be observed that the lower- and middle-income group show more vulnerability from the impacts of WFH as compared to the higher economic class. (Figure 16)

Histogram of Figure 17 highlights the occupations more susceptible from the impacts of WFH on their holistic health. Health sector is least affected, whereas the service sector, businesses and engineering professions are at a higher risk.

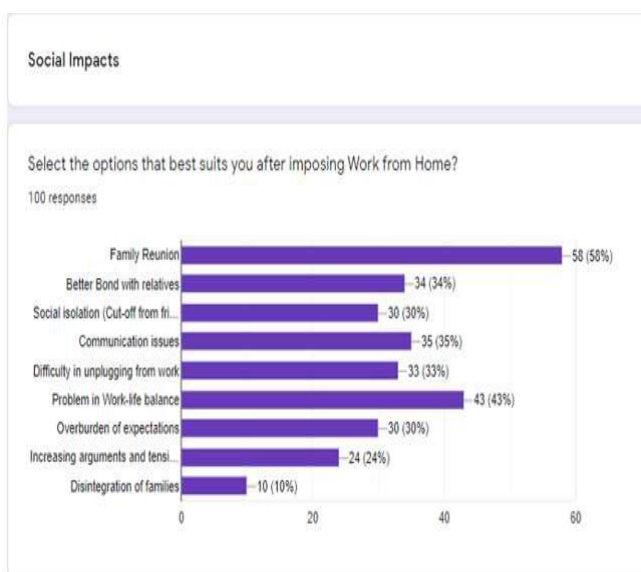


Figure 8: Intensity of each factor of Social Impacts.

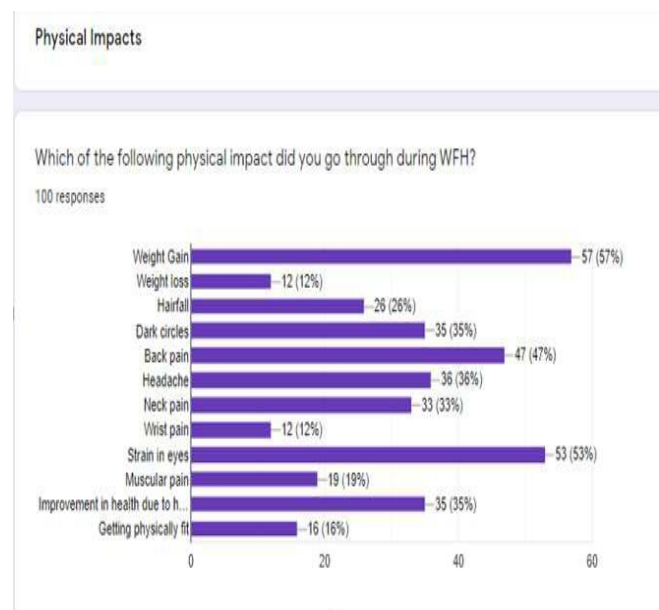


Figure 9: Intensity of each factor of Mental and psychological Impacts.

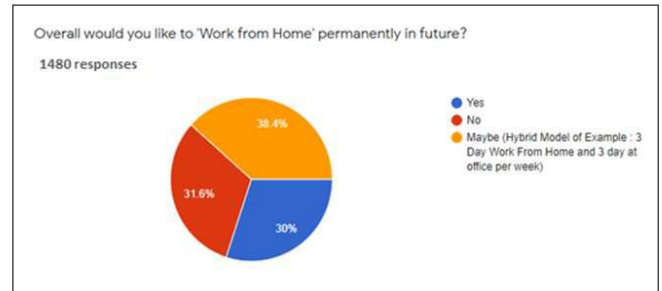
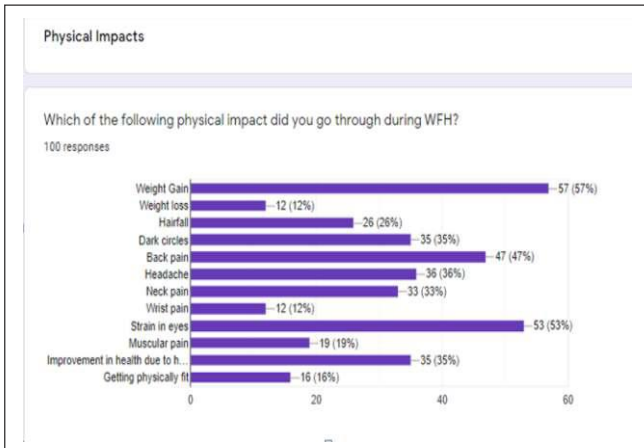


Figure 11: Responses to feasibility of WFH Model in future.

Figure 10: Quantification of intensity of each factor of Physical and ergonomic impacts due to WFH.

Summary of Meta-analysis on association of Holistic health impacts with different human variables											
Variables Impacts		Personal Variables		Socio-economic Variables				Professional Variables			
		Gender	Age-group	Type of Location	Family size	Participants having children	Economic status	Occupation	Type of work	Type of Worker	Prior WFH experience
Social Impacts	Family Reunion		30-60			Yes			Full-time	Migrant	
	Social isolation	Males	40-60	Urban				Service sector and Physical occupations			
	Communication issues		40-60			No	Average	Education and arts, sales and marketing			No
	Work-life balance	Females	30-50	Urban		Yes		Engineering and Architecture, Technicians	Full-time		
	Increasing expectations	Males and Females			Joint	Yes	Average			Temporary	
Mental and Psychological Impacts	Irregular routine	Females		Urban	Joint	Yes			Full-time	Permanent	
	Sleep disorders		50-60		Nuclear		Average		Full-time		
	Laziness and fatigue		20-30		Nuclear	No					
	Lack of self confidence	Females	50-60	Rural		No teens		Education and arts; Service sector and physical occupations			No
	Fear of losing jobs								Part-time	Temporary and Migrant	No
	Lack of time for oneself	Females			Joint	Yes	Average		Full-time		No
	Anger issues, frustration	Females	40-60								
Depression and trauma		20-30		Joint	No	Low or average	Engineering and Architecture, Technicians		Temporary and Migrant	No	
Tension free atmosphere as everyone is around	Males			Nuclear and Joint	Yes	Low or average			Migrant		
Physical and Ergonomic impacts	Weight gain		40-60	Urban			Average	Computer science, basic science and research	Full-time		
	Hairfall	Female		Urban	Joint and Nuclear		Average				
	Dark circles		20-30					Computer science, basic science and research			
	Strain in eYes		40-60								
	Headache		30-50								
	Backpain										
	Neckpain		40-60	Urban			Average or Low	Service sector and Physical occupations			No
	Wrist pain										
	Muscular pain										
	Improvement in physical health	Males								Migrant	

Figure 12: Meta-analysis indicates those human variables that are predominantly impacted.

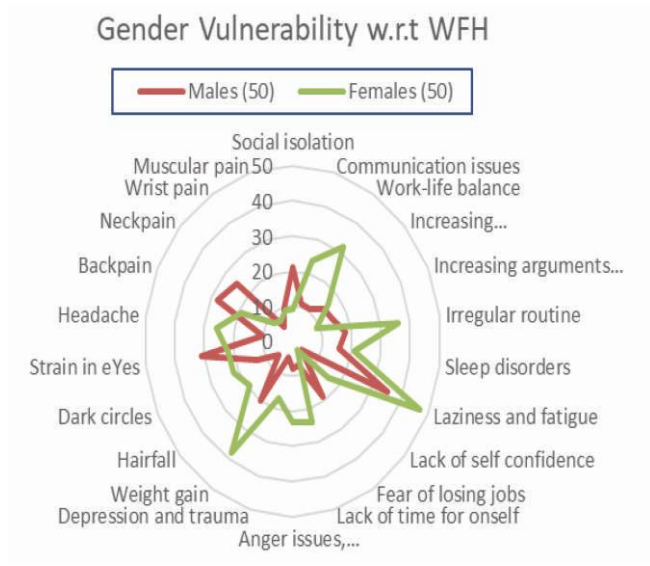


Figure 13: Working- Women are more susceptible to the health issues due to WFH.

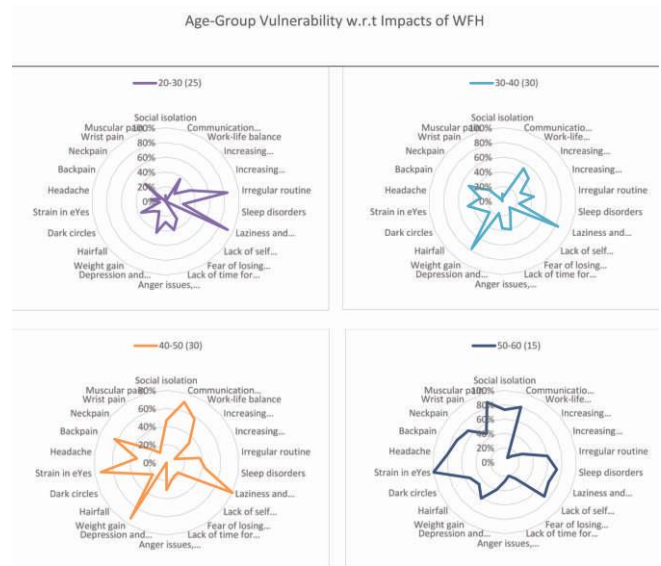


Figure 14: Impacts of WFH are predominant on holistic health of workers of age-group 40-50 and 50-60.

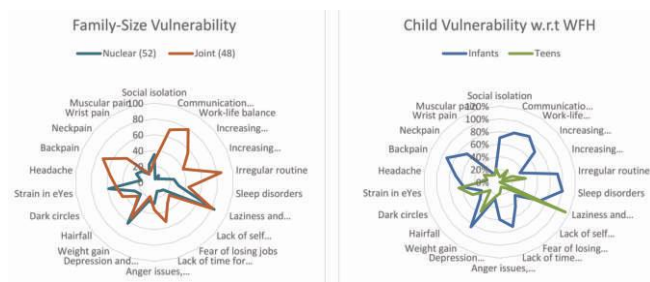


Figure 15 : Employees belonging to Joint -family are more prone to holistic health issues due to WFH and those having infants are more vulnerable than those having only teenager children.

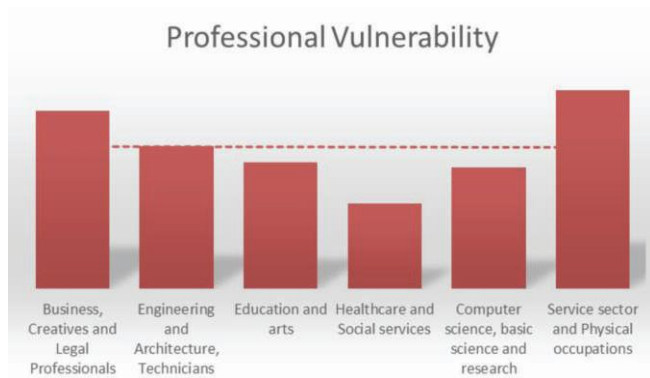


Figure 17: Vulnerability of Professions reporting prominent health issues due to WFH.

DISCUSSION

64% females reported problems in work-life balance, while only 22% males claimed that issue. In order to satisfy the dual roles, working-women fulfill their responsibility for household chores, compromising sleep and skipping meals to

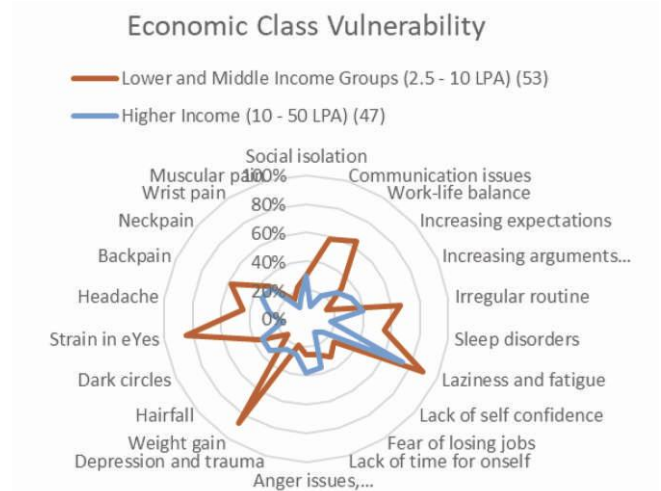


Figure 16: Lower- and middle-income groups are more vulnerable to health impacts due to WFH as compared to the higher economic class.

meet to work-targets and deadlines, in turn affecting their physical and psychological health. In order to balance both tasks simultaneously on daily basis, women undergo stress (62%) and report symptoms of depression(34%). Our outcomes align with findings of other researchers that working-women are more vulnerable to developing depression while WFH during the pandemic (Sato, et al., 2021) (Solomou & Constantinidou, 2020).

One more implication from our study is that people with low- or middle-income group report 34% more health issues than those from higher economic class. Individuals with lower-income cannot afford the technological and ergonomic requirements of WFH, and also lack job-security which can

subsequently lead to anxiety and a phenomenal increase in stress levels (Wilson, et al., 2020) (Stanton, et al., 2020). Those who do not have a dedicated workspace with appropriate adjustments are more likely to report musculoskeletal and visual symptoms (Kelishadi & Sadegh, 2020) (Xiao, et al., 2021). A study by Michelle M. Robertson, 2016 suggests Human Factors/Ergonomics (HF/E) considerations for remote-working (Robertson & Mosier, 2016). WFH allows workers to set-up a dedicated workplace and adjust the IEQ factors (lighting, temperature, humidity, air quality, noise, ergonomics, etc.) according to their personal preferences to improve productivity and well-being (Robertson & Mosier, 2016) (Vimalanathan & Thangavelu, 2014) (Rodrigues, et al., 2017).

The results of this study capture the deleterious role that family-work conflict and a chaotic environment play on WFH outcomes. Ironically individuals from a joint family report 65% more health-impacts than those from nuclear families. Over burden of expectations from intergenerational family, distracting environments and lack of privacy due to overcrowded homes may reduce engagement and motivation to work, exerting a negative influence on the productivity and psychological segment of employees (Galanti, et al., 2021). Unlike the traditional assumption of having a toddler at home can be a positive predictor of well-being, working-parents having infants or kids had higher chances of reporting holistic health issues (Xiao, et al., 2021). Our outcomes further support this inter-relationship. The meta-analysis suggests that workers having infants reported 56% more health-impacts than those who do not have infants (Figure 12, Figure 15). To minimize the distractions from children while WFH, it is recommended by other authors to have a private space and appropriate work-space at home. Besides that having at least one teenager lowered the chance of reporting new health issues. Studies suggest that in spite of being a source of distraction, teenagers are comparatively more independent, require less supervision, and can abate in household tasks (Rao & Indla, 2010) (Xiao, et al., 2021).

There are some suggestions for subsequent research in this field that derive from the current study. Indeed, our model, although including many variables, gives only a trivial account of the multiple dynamics that underlie the complex phenomenon of the WFH. Based on this, we believe it is important that ensuing studies take into consideration, a more representative sample and a more precise research design, particularly among professional and personal resources. Such meta-analysis can open important horizons for future longitudinal studies, which still have much to investigate on the complex reality of remote work and its outcomes in terms of employees' well-being and health.

CONCLUSION AND RECOMMENDATIONS

Overall outcomes from this study indicate that the impacts of WFH on individuals' holistic health vary considerably.

Significant stressors in social impacts include work-family conflict and overburden of expectations. Due to difficulty in unplugging from work, work-life boundaries are blurred. Visual symptoms due to prolonged screen-exposure and musculoskeletal problems due to poor postures in addition to lack of consideration of ergonomics, led to decline in physical health of workers. Swap in the modus operandi may cause issues such as inferiority-complex, irritability, loneliness, fear of losing jobs, and chronic stress. Ongoing work-family conflict can lead to detrimental psychological issues such as insomnia, burnout, identity crisis, depression and emotional exhaustion.

Significant findings emerging from the meta-analysis of this study imply that impacts of WFH vary considerably with life-course stage, gender, profession type and socio-economic status. From the systematic review, the variables vulnerable to deterioration of holistic health were of either criterion – Age: exceeding 40 years (61%); Gender: Females (55%); family-type: Joint (62%); Children: Infants (69%); Annual income: lower- or middle-income groups (60%). This study highlights factors that impact holistic health and well-being of workers while working from home and provides a foundation for considering the best for a positive WFH experience.

In this study we investigated the feasibility of WFH in foreseeable future. In contrast to the predictions, though 30% oppose WFH being incorporated into future work culture, nearly 70% respondents' desire continuity of WFH.

Despite this being a time-bound analysis, a systematic methodology was adopted for conducting the survey. A further strength was the undertaking of a formal quality appraisal with preliminary survey and database, to reduce the likelihood of biasedness and ensure existence of all permutations and combinations of diverse demographics, work profiles and their respective association with WFH. Our study demonstrates the impact of WFH on the physical and mental well-being of workers. However there are limitations as far as the interpretation and use of these outcomes is concerned. The outcomes are not meant to directly depict conventional WFH circumstances, since the data was obtained within a limited span during the pandemic and may not illustrate the health-status or experiences, once the WFH model becomes progressively routine. While the implications of the data are valid, our sample included over-representation from workers in India, application of the results may not be widely generalizable overseas and may vary from the experiences of individuals with different backgrounds. Though the respondents characterized wide range of work-profiles, the occupational genres of study are neither representative of all professions nor do these facts state all work-profiles within each category.

To circumvent the impacts of WFH on holistic health,

keeping in mind their flexibility and productivity, we would like to recommend conditional continuity of WFH by suggesting incorporation of a hybrid model into the future work culture with appropriate consideration of work-home boundaries, division of tasks and role-clarity, training sessions for managers, facilitation of co-worker networking, performance-indicators, management and technical support. Depending on the occupation, a hybrid model can be prepared and implemented wherein the authorities can divide the staff into groups and incorporate rotating shifts of employees working on-site and employees Working-from-Home. This way everyone gets equal opportunities and work-life balance. This will help in revolutionizing the Indian work-culture, keeping in mind the health and safety of employees.

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