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Morbidity Profile and Associated Risk Factors among Power-loom Weavers in Mau District in Uttar Pradesh

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ABSTRACT

The power loom industry of Mau is ancient, and a very limited study is existing in Indian literature on the occupational health status of these workers, which are exposed to various occupational hazards. This study aims to assess the morbidity profile and associated risk factor among Powerloom weavers in Mau district of Uttar Pradesh. A sample of 300 workers selected from the identified power loom industries from six blocks of Mau district. The data were collected using a structured questionnaire and morbidity were asses using operational definition. Bivariate and Multivariate statistical analysis. Most of them belonged to the above age 30 (88%). The study found a prevalence of selected morbidities of impaired vision (48.7%), Anxiety (63.7%), Injury (25.7%), and pain in the lower back (56%). Anxiety, Lower back pain, and impaired vision were associated with the workplace environment. Similarly, Injury, low back pain, and low vision were significantly related to work duration. The present study shows the high prevalence of low back pain, impaired vision and injury among the weavers, along with anxiety, which indicates a need for periodic medical examination to rule out occupational hazards.

Keywords: *Powerloom, Weavers, Occupational health, India*

India has the distinction of being the second-largest producer of textile fiber globally (GOUP, 2018) and contributes 5 percent to India's GDP (IBEF, 2017). Further, it is also the second-largest sector providing employment after the agricultural sector and employs in urban and rural areas by providing jobs to over 45 million people directly and indirectly to more than 60 million (Subash Kumar & Das, 2019).

Powerloom is a cornerstone of the Indian economy in foreign exchange in the textile sector (GOI, n.d.). Uttar Pradesh is the third highest fabric producing state of India and employed about 4.21 lakh Powerloom weavers (GOUP, 2018).

Mau is considered the powerhouse of textile weavers in Eastern Uttar Pradesh because every household in this district has a loom used for making sarees, loincloths, suits, etc. (DoMSME, n.d.) About 21000 units of Powerloom and 40000 weavers are in the district (Surendra Sharma, n.d.).

The power loom industry exposes its workers to airborne dust, which contains infections, allergies, and Toxic substances related respiratory syndrome (Oldenburg et al. 2007) called Byssinosis (Chadha et al. 2019). Along with respiratory illness, they are also affected by additional occupational hazards mainly occurring due to threads, emitting hazardous chemical substances, long manual working hours, Noise pollution, etc (Sultana & Nisa, 2017). Poor ergonomics condition causes pain in hands and legs, and repetitive injuries like wrist, neck, shoulder, and knee (Kolgiri & Hiremath, 2017). Due to poor working conditions (Khan et al. 2015) and lack of personal protective equipment (Prasad et al. 2015), weavers are exposed to many occupational hazards.

Literature Review

Little information is available regarding the morbidity pattern of Powerloom workers in developing countries especially in India. A study was done in India among Powerloom workers found prevalence of Byssinosis were 98% (Chadha et al. 2019). The main disease conditions of textile workers in Rajasthan were body pains (19.4%), respiratory illness (12.1%), and fever (7.7%). Workers employed in dyeing suffered the most (25.5%) from aches, while workers belong to printing and bleaching groups mostly suffered from respiratory problems (15.5%) (Singh et al. 2005). In another research conducted in Meerut city of UP, it was found that most of the power loom workers are facing respiratoryrelated issues (52%), musculoskeletal problems (22%), injuries (14%), and hearing loss (8%) (Goel et al. 2013).

With the increase of population and demand for clothing accordingly, morbidities are also growing among weavers. It is also observed that limited studies have been carried out in India among occupational hazards among Powerloom weavers. Further, these studies have also not considered the occupational and individual characteristics that also determine the weavers' health related risks. So the present study was designed to describe self-reported morbidities patterns among Powerloom workers and study the association between these morbidities with occupational characteristics like duration of work in years, substance use, and work environment.

Methods

Design of the Study

This was a cross-sectional descriptive study conducted during August-September, 2019, in the Mau district of Uttar Pradesh, part of a Ph. D. program. There are nine blocks in Mau district from them; six blocks were selected where more Powerloom industries are set up. These six blocks were Ranipur, Ghosi, Dohrighat, Muhammdabad, Kopaganj, and Pardaha.

Sample size and sampling

A total of 300 weavers were interviewed for the study, keeping in mind limited resources. From each blocks, 50 power loom weavers were selected. The selection process kept in mind that all social groups were selected in the study. Prior permission was taken for an interview, and wearing house was decided for an interview place to observe the working condition.

Study Variables

Socio-demographic related background data were collected using a self-developed questionnaire. Socio-demographic data consisted of age, education, family type, family members, caste, religion, marital status, residence, Type of house, Monthly income, Monthly medical expenses, healthcare utilization. Some occupational characteristics, like work duration, substance use, and Work Place environment, were also captured.

Outcome variables

The outcome variables used in the study are "Impaired vision," "Anxiety," "Injury," and "Low back pain," and measured responses in 'Yes' and 'No'. During the survey, impaired vision was assessed by

asking, “do your sight reduce from the past or how well you can see while doing close work such as reading or putting a thread into a needle”. Similarly, anxiety was asked, as do you feeling stress in the past three months.

The injury was asked, “do you meet any accidents while working in the last 12 months”? Similarly, regarding back pain question was asked as “Do you develop back pain during 12 months?”

Data entry and analysis

Data were entered using Epi Info and were further cleaned and analyzed using the IBM SPSS Version 23. Descriptive as well as inferential analysis is conducted. For this purpose, significant predictors for selected morbidities in the bivariate analysis were performed using a regression model. The odds ratios and their 95 percent CI were calculated. A P-value of less than 0.05 was considered to be statistically significant.

Ethical Clearance

Ethical approval was obtained from the Department of Economics, Chhatrapati Shahu Ji Maharaj University Kanpur. While, the research center for the study was Feroze Gandhi College in Rae Bareli, Uttar Pradesh. The respondents were given orientation concerning all relevant information about the study, and oral consent of participants was obtained. Only persons above aged 18 are included in this study with assurance about the confidentiality of individuals.

Results

Weavers’ age distribution was 46−60 years (40%), followed by 31-45 (34.7%) in the study sample. About 8 % of the respondents were illiterate, while 34% had received primary education, and 15% were received graduation and above qualification. Most respondents have joint families (76%) and more than five family members (85%). Nearly all of them (98%) were Muslims and belonged to the OBC caste (96%). Around 88 % of the family income of them was less than ten thousand (Table 1). Table 2 shows the distribution of study participants according to their occupational and personal attributes. The majority (77%) of workers had more than ten years of works exposure. Concerning 300 workers, only 51% used substances, including bidi smoking and pan masala. More than 50 percent reported their workplace was congested, and about 27 % said the workplace was sufficient space, and only 18 % reported the workplace has adequate or good ventilation. Table 3 shows the self-reported morbid conditions prevalent among workers. The selected morbidities prevalence was anxiety (63.7%), back pain (56%), impaired vision (48.7%), and injury (25.7%).

Table 1: Socio-demographic profile of Powerloom weavers

Variables		n(%)
Age (in years)	≤30	35(11.7)
	31-45	104(34.7)
	46-60	121(40.3)
	60 +	40(13.3)
Education	No education	24(8.0)
	Primary	102(34.0)
	Secondary	50(16.7)
	Higher Secondary	78(26.0)
	Graduate and above	46(15.3)
Family type	Nuclear	229(76.3)
	Joint	71(23.7)
Family member	≤ 4	43(14.3)
	5 to 8	158(52.7)
	≥9	99(33.0)
Caste	OBC	289(96.3)
	Non OBC	11(3.7)
Marital status	Married	276(92.0)
	Unmarried	24(8.0)
Religion	Hindu	5(1.7)
	Muslim	295(98.3)
Residence	Rural	197(65.7)
	Urban	103(34.3)
Type of house	Kutcha	20(6.7)
	Semi Pukka	56(18.7)
	Pukka	224(74.7)
Monthly Income	<5000	165(55.0)
	5000-10000	98(32.7)
	>10000	37(12.3)
Expenditure on Medical (Monthly)	<500	43(14.3)
	500-1000	93(31.0)
	1000-2000	65(21.7)
	>2000	99(33.0)
Healthcare utilization	Government	3(1.0)
	Private	130(43.3)
	Medical store	31(10.3)
	Quacks	136(45.3)
Total		300(100.0)

Source: *Primary survey.*

Table 2: Occupational profile of Powerloom weavers

Variables		n(%)
Work duration (in years)	<10	69(23.0)
	10-20	79(26.3)
	21-30	91(30.3)
	>30	61(20.3)
Substance use	No	146(48.7)
	Yes	154(51.3)
Work Place	Congested	165(55.0)
	Sufficient	80(26.7)
	Good ventilation	55(18.3)
Total		300(100.0)

Source: *Primary survey.*

Table 3: Prevalence of various morbidities among the Powerloom weavers

Variables		n(%)
Impaired vision	No	154(51.3)
	Yes	146(48.7)
Anxiety	*No*	109(36.3)
	Yes	191(63.7)
Injury	*No*	223(74.3)
	Yes	77(25.7)
Low back pain	*No*	132(44.0)
	Yes	168(56.0)
Total		300(100.0)

Source: *Primary survey.*

Table 4 shows the association between occupational characteristics and self-reported morbidity patterns among the Powerloom weavers. The finding indicates that the duration of work was significantly associated with injury and impaired vision. Similarly, a significant association was found between the workplace with anxiety, back pain, and impaired vision. Substance use is not associated with any morbidities in present study.

Bivariate logistic regression analysis, as reported in Table 5, reveals that weavers with work exposure of 1020 years (AOR 0.421 (95 percent CI 0.204-0.869)) and 2130 years (AOR 0.428 (95 percent CI 0.156-0.666)) were at low risk of injury compared to weavers with less than ten years of work exposure. Anxiety was an independent risk factor among weavers and seen less among those working in good and adequate ventilated workplaces than those working in congested workplaces. Low back pain was higher among weavers having greater than 30 years of work exposure (AOR 2.614 (95 percent CI 1.2315.55)) compared to those weavers whose work exposure less than ten years. Back pain was also found a higher risk factor among weavers reported adequate or good ventilation than those reported congested workplaces. Impaired vision reported higher among those reported work exposures for more than 30 years (AOR 2.332(95 percent CI 1.105-4.921)) compared to those reported less than ten years. The impaired vision was reported less among those reported adequate ventilated workplaces than those reported congested workplaces (AOR 0.291 (95 percent CI 0.144-0.588)).

discussion

The power loom industry weaves grey cotton by power operated machines or looms and converts it into a fabric with warp assistance in the form of beam and weft directly through bobbins. Weft yarn comes from spinning mills while beams come from processing mills. Yarn thread is produced by spinning mills as raw materials and supplied to the Power loom industries. The Processing mills prepare warp in the form of the beam, and the power loom industry uses these beams for weaving cloth (Paul, 2013). Powerloom workers in India constitute a large workforce and are susceptible to several health problems due to the workplace environment.

In the present study, we try to access some of these health problems through an operational definition. The study found the prevalence of poor sight or impaired vision was 48.7 percent, which is higher from a study done in West Bengal (20 percent) (Paul, 2013), Mau (11%) (Sultana & Nisa, 2017) and Telangana

(41.4 percent) (Prasad et al. 2015). It was found that continuous work, which is repetitive and constant visual attention to detail, severely impacted the workers vision (Hiremath et al. 2014). During the interview, researcher's observed lack of uniform and proper lighting facilities in the work place. The thread used in weaving is thin, and therefore continuously working for long hours may affect their vision.

Table 4: Association between occupational characteristics and self-reported morbidity pattern among the Powerloom weavers

Variables		Anxiety	Injury	Low back pain	Low vision
Work duration	<10 years	44(23.0)	28(36.4)	36(21.4)	30(20.5)
(in years)	10-20 years	47(24.6)	17(22.1)	42(25.0)	33(22.6)
	21-30 years	54(28.3)	16(20.8)	47(28.0)	43(29.5)
	>30 years	46(24.1)	16(20.8)	43(25.6)	40(27.4)
	P value	0.174	***0.008***	*0.087*	***0.026***
Substance use	No	86(45.0)	43(55.8)	87(51.8)	68(46.6)
	Yes	105(55.0)	34(44.2)	81(48.2)	78(53.4)
	P value	0.095	0.144	0.223	0.480
Work Place	Congested	122(63.9)	44(57.1)	85(50.6)	84(57.5)
	Sufficient	42(22.0)	17(22.1)	42(25.0)	49(33.6)
	Good ventilation	27(14.1)	16(20.8)	41(24.4)	13(8.9)
	P value	***<0.001***	*0.537*	***0.009***	***<0.001***
Total		191	77	168	146

Table 5: Binary logistic regression showing the adjusted effects of selected characteristics on self-reported morbidities among Powerloom weavers in the Mau district of Uttar Pradesh

		Adj OR (95% C.I.)	Adj OR (95% C.I.)	Adj OR (95% C.I.)	Adj OR (95% C.I.)
Variables		**Anxiety**	**Injury**	**Low Back pain**	**Impaired vision**
Work duration	*<10*	®	®	®	®
(in Years)	*10-20*	0.79(0.395-1.578)	0.421*(0.204-0.869)	1.146(0.589-2.23)	0.849(0.431-1.674)
	21-30	0.815(0.416-1.595)	0.322**(0.156-0.666)	1.067(0.56-2.033)	1.051(0.547-2.019)
	>30	1.709(0.771-3.789)	0.578(0.27-1.237)	2.614*(1.231-5.55)	2.332*(1.105-4.921)
Substance use	*No*	®	®	®	®
	Yes	1.527(0.925-2.52)	0.708(0.412-1.217)	0.693(0.428-1.121)	0.996(0.614-1.616)
Work Place	*Congested*	®	®	®	®
	Sufficient	0.354**(0.199-0.631)	0.805(0.419-1.548)	1.041(0.602-1.801)	1.488(0.854-2.593)
	Good ventilation	0.333**(0.175-0.635)	1.067(0.534-2.134)	2.831**(1.422-5.637)	0.291**(0.144-0.588)

Notes: *®Reference group. ** ,* Significant at 5 and 1 percent levels, respectively;* ***Source:*** *Primary survey.*

The present study found anxiety among 63.7 percent weavers. Individuals from low socio-economic status are more likely to be depressed or anxious than from high socio-economic status (Rai et al. 2013). Handloom weavers were getting ` 70 to 100 per sari, which is the rate for many years. Suffering from any health problem was also one reason for psychological health among workers (Ahmad, 2017) because they spent a considerable amount of their income on health.

The present study found the prevalence of injury during the last 12 months which was 25.7 percent among weavers. A previous study also finds the prevalence of injury among weavers in the Nalgonda district (27.8%) (Prasad et al. 2015) and Guntur District (2.75%) (Yerpude & Jogdand, 2010) in Telangana. People are working in this industry without any formal training, which resulted in accidents. The reason for it may be because weavers were not taking adequate preventive. Lack of any dress code was another reason. The Male were working with loose Kurta-Pajama and the females in sari/dupatta, which is hazardous while working with Powerloom machines.

The prevalence of low back pain found was 56 percent among weavers. A previous study affirmed the prevalence of low back were in Nalgonda district (57.6%), Telangana (Prasad et al. 2015), Ahmedabad (45 %) (Nag et al. 2010), Wardha (11.1%) (Rajnarayan R Tiwari et al. 2003), and Mau (21%) (Sultana & Nisa, 2017). Consequently, working posture, Improper loom design, working hours and duration, repetitive work, and type of seating (Choobineh et al. 2007) were responsible for back pain. Further, high physical demands and insufficient recovery time also contribute to developing low back pain (Singh et al. 2005).

The bivariate analysis shows that anxiety was significantly associated with the workplace environment. Additionally, the multivariate analysis also indicates that weavers working at a sound or adequate workplace have lower stress. Physical work environment such as temperature, indoor air quality, less light, and non-presence of windows affect workers' psychological health (Shea et al. 2011). The injury was significantly associated with work exposure duration, and multivariate analysis shows that more experienced weavers were lesser injuries. It may be because older workers are experienced, mature, and are mindful of workplace hazards. On the other side, younger workers are reckless and first-hand to workplace hazards (Root, 1981).

Multivariate analysis found that those who have more years of experience were more likely to back pain. Similar findings were found in a study conducted in the city of Ahmedabad (Nag et al. 2010). The occupation that required a person to lift heavy objects, pushing or pulling items involves twisting or vibrating one's spine, resulting in injury to the spine and back pain. Likewise, working in Powerloom that required bending posture result in pain. The lower back incidence increases with age because of bone loss that can lead to fractures. Concurrently, a person may suffer from reduced muscle elasticity and tone decrease (NINDS, n.d.).

In bivariate and multivariate analysis, the impaired vision was associated with the duration of work. Those who have a higher employment span were more likely to affect vision. Weaving is precise, which used very thin threads that required significant visual and mental attention. Weaving activities also need a long duration of exposure; the extra-ocular muscles may get tired. The above conditions may be the reason for impaired vision among weavers (Salve, 2015).In bivariate analysis, the impaired vision was also associated with the workplace environment. Weavers working in a well-ventilated workplace were less likely to affect vision. A sufficient amount of light for a healthy eye has become a matter of great concern for increased efficiency in work and the prevention of accidents (Divatia, 1968).

The study, too, has certain limitations. The research is part of a Ph.D. attempted on the socio-economic situation of power loom weavers. Only a few selfreported morbidities related information was sought from weavers during the study. The cross-sectional approach and the possibility of selection bias are the possible major weaknesses of this study. There is a scope of more extensive research among Powerloom weavers in Mau district in Uttar Pradesh.

conclusion

The present study found a high prevalence of selected morbidities like Low vision, low back pain, stress, and injury among power loom weavers. This study also remarked that the possible solution for decreasing the problem would be a constant flow of work with apt wages, augmented ventilation and lighting system, periodic medical check-ups, adequate rest time, and job rotation. This research focussed on the health of the power-loom workers in the Mau district. Henceforth, there is a need for an awareness program on occupational hazards and periodic medical examinations to be done by the doctor. It would help in early diagnosis and treatment of morbidities prevailing among the weavers.

RefeRences

Ahmad, A. 2017. Prevalence and predictors of occupational stress among quarry workers in rural Rajasthan, India. Journal of Public Mental Health, 16(4): 132–143.

Chadha, S., Kundu, D., Sagili, K. and Das, A. 2019. Byssinosis and tuberculosis amongst "home-based" powerloom workers in Madhya Pradesh State, India. Indian Journal of Tuberculosis,66(3): 407–410.

Choobineh, A., Hosseini, M., Lahmi, M., Khani Jazani, R. and Shahnavaz, H. 2007. Musculoskeletal problems in Iranian hand-woven carpet industry: guidelines for workstation design. Applied Ergonomics, 38(5): 617–624.

Divatia, A. 1968. Ocular problems in cotton industry. Indian Journal of Ophthalmology, 16(4): 192–195.

Paul, U. 2013. A study of socio economic status of workers in the unorganized powerloom sector of West Bengal. Global Advanced Research Journal of Agricultural Science, 2(2): 065–073.

DoMSME. (n.d.). Official Website of One District One Product Uttar Pradesh / Mau. Retrieved August 23, 2020, from http:// odopup.in/en/article/Mau Goel, K., Ahmadr, S., Parashar, P., Bansal, R., Pant, B. and Goel, P. 2013. Health status and treatment seeking behavior amog power loom workers in an urban slum of Meerut city in U.P.

Journal of Advance Researches in Medical Sciences, 5: 67–71. from GOI. (n.d.). Powerloom Industry In India. Retrieved August 22, 2020, https://www.indiantradeportal.in/vs.jsp?lang =1&id=0,30,50,177

GOUP. 2018. Textile Weaving Prosperity. UP Investor Summit (2122 Feb).

Hiremath, R.B., Kattumuri, R., Kumar, B. and Hiremath, G.R. 2014. Health and safety aspects of textile workers from Solapur (India) textile industries. Indian Journal of Community Health, 26(4): 365–371.

IBEF. 2017. Textile Industry & Market Growth in India, India Brand Equity Foundation. https://www.ibef.org/archives/ detail/b3ZlcnZpZXcmMzcxMTAmMTEy Khan, A.W., Moshammer, H.M. and Kundi, M. 2015. Industrial hygiene, occupational safety and respiratory symptoms in the Pakistani cotton industry. BMJ Open, 5(4): 1–8.

Kolgiri, S. and Hiremath, R. 2017. Occupational Health Assessment of Power-loom Industry Workers in Solapur City. International Journal of Medical Science and Innovative Research, 2(6): 329–334.

Nag, A., Vyas, H. and Nag, P.K. 2010. Gender differences, work stressors and musculoskeletal disorders in weaving industries. Industrial Health, 48(3): 339–348.

NINDS. (n.d.). Low Back Pain Fact Sheet | National Institute of Neurological Disorders and Stroke. Retrieved September 2, 2020, from https://www.ninds.nih.gov/Disorders/Patient

Caregiver-Education/Fact-Sheets/Low-Back-Pain-Fact-Sheet Oldenburg, M., Latza, U. and Baur, X. 2007. Exposure–response relationship between endotoxin exposure and lung function impairment in cotton textile workers. International Archives of Occupational and Environmental Health, 80(5): 388–395.

Prasad, V.G., Malhotra, V. and Nagaraj, K. 2015. Morbidity profile of cotton weavers in Rural South India. International Journal of Scientific Research, 4(5): 478–481.

Rai, D., Zitko, P., Jones, K., Lynch, J. and Araya, R. 2013. Country- and individual-level socioeconomic determinants of depression: multilevel cross-national comparison. The British Journal of Psychiatry, 202(3): 195–203.

Rajnarayan R Tiwari, Pathak, M.C. and Zodpey, S.P. 2003. Low Back Pain among Textile Workers. Indian Journal of Occupational and Environmental Medicine, 7(1): 27–29.

Root, N. 1981. Fewer Injuries Among Older Workers. Monthly Labour Review.

Salve, U.R. 2015. Vision-related problems among the workers engaged in jewellery manufacturing.

Indian Journal of Occupational and Environmental Medicine, 19(1): 30–35.
Shea, T., Pettit, T. and Cieri, H. De. 2011. Work environment stress:
The impact of the physical work environment on psychological health. A Snapshot Review.
Singh, M.B., Fotedar, R. and Lakshminarayana, J. 2005.
Occupational Morbidities and their Association with Nutrition and Environmental Factors among Textile Workers of Desert Areas of Rajasthan, India. Journal of Occupational Health, 47(5): 371–377.
Subash, K. and Das, S. 2019. Occupational health and safety in SMEs. International Research Journal of Engineering and Technology, 6(10): 1140–1143.
Sultana, F.M. and Nisa, M. 2017. Female work participation and health status in power loom sector: A case study of Mau city. International Journal of Applied Research, 3(6): 451–456.
Surendra Sharma. (n.d.). Brief Industrial Profile of Mau District (Issue 0542).
Yerpude, P.N. and Jogdand, K.S. 2010. Morbidity profile of cotton mill workers. Indian Journal of Occupational and Environmental Medicine, 14(3): 94–96.

Constraints Faced by Students of Agricultural Universities in Digital Learning

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ABSTRACT

Digital technology is the major game-changer in human history. Digital technology is implemented into our everyday life. With the introduction of digital devices and cell phones into student education, high-speed internet and digital devices were given top priority in urban and rural India. However, in the wake of the Covid-19 pandemic, it becomes mandatory to conduct online classes for the students to continue their academic curriculum. Although the students are facing number of challenges in usage of digital learning and different adaptation strategies are adopted by students also. The purpose of the study was to determine the challenges and adaptation in Digital Learning by the students of Agricultural Universities. For this research, two universities, namely Bihar Agricultural University, Sabour and Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, were purposefully selected, and from each college, 60 students were randomly selected. Total of 120 students was chosen from both colleges. The results of study depicted that majority students chose deficiency of printers, lack of interrupted internet service, slow processing speed of devices, high initial cost of digital tools, distraction during lecture, sleep cycle causing eye-irritation, headache, backpain and other physical and mental stresses.

Keywords: *Challenges, Digital devices, Digital learning, Online class, backpain, stress*

A variety of factors influence both teachers' and students' adoption and acceptance of digital learning technology in the teaching-learning process. However, since the nature of Digital Learning relies heavily on students voluntarily accessing and interacting with the computer and the internet technology. Researchers suggest that one of the biggest challenges for Online Learning is student retention. The major constraint that these students' faces concerning the use of the internet were slow speed and information overloading and irrelevant information (Malik and Mahmood, 2010) although students agreed smartphones are more advantageous in Digital Learning (Choudhary, 2016). Students utilize online education devices at medium extent, majority of students prefer laptop and smartphone as device and in application search engines Google Chrome and M.S. Word was priorities for research activity and others (Doddamani et al. 2020). Furthermore, the use of online social media would enable students to become more innovative, dynamic, and connected to global instructors for collaborative learning (Ansari et al. 2020). Digital learning in the College of Agriculture had the experience of online classes provided greater time flexibility and enabling students to avoid time conflicts of scheduling classes or work (Jayaratne and Moore 2017). Highest-rated disadvantage of e-learning system was the 'technology issues' factor (Yaghoubi et al. 2008). Learners do face some problems such as password problems, computer vision syndrome (CVS), fingers' joint pain, backache, dizziness & headache, and electricity failure (Hussain, 2007).

METHODOLOGY

The study was conducted in Bihar Agricultural University (BAU), Sabour and Bidhan Chandra Krishi Viswavidyalaya (BCKV), Mohanpur. Both these universities are renowned agricultural universities in eastern India. A total of sixty students were selected randomly from each university for the study, whereas 30 students were from Under Graduate (UG), 20 students from Post Graduate (PG) and 10 students from PhD. Over all 120 students were selected from both the universities. Questionnaire was developed for data collection and it included both, closed ended as well as open-ended questions. The responses of the respondents regarding the tools and techniques used for digital learning by the students was collected in 5-point Likert Scale (1932) i.e. to very frequent, frequent, sometimes, rarely and never. The gathered data was collected, tabulated, analysed and interference were made in accordance with objective.

RESULTS AND DISCUSSION

Infrastructural constraints faced by the students in digital learning in which 'Deficiency of printer in hostel' stands at first rank with overall MPS 81.3. The same trend seen in both universities with MPS 81.4 and 80.6 in BAU and BCKV respectively. 'Interrupted internet speed' stands second with overall MPS 79.8. The same ranking shown in BAU with MPS 81, and in BCKV it stands at third position with MPS 78.6. 'Deficiency of computers' stands third position with overall MPS 78.6. It stands third in BAU also with MPS 79, where in BCKV it stands at fourth position with MPS 78.3. 'Electricity breakdown' stands at fifth position with overall MPS 75.1. The same stand at second position in BCKV with MPS 79.6 and in BAU it stands at fifth position with MPS 70.6. 'Limited power backup' stands at fifth position with overall MPS 71.8. The same trend had seen in both universities where it stands at fifth with MPS 71 and 72.6 in BAU and BCKV (Table 1).

Table 1: Infrastructural constraints faced by the students in use of digital learning

Sl. No.	Infrastructural Constraints	BAU, Sabour (n1= 60)		BCKV, Mohanpur (n2= 60)		Overall (Total) (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Deficiency of computers	79	III	78.3	IV	78.6	III
2	Interrupted internet speed	81	II	78.6	III	79.8	II
3	Deficiency of printer in hostel	81.4	I	80.6	I	81.3	I
4	Limited power backup	71	IV	72.6	V	71.8	V
5	Electricity breakdown	70.6	V	79.6	II	75.1	IV

MPS = Mean Percent Score.

Students faced different technical constraints in digital learning. 'Slow processing speed of devices' stands first with overall MPS 81.1. The same trend had seen in both universities, it stands first with MPS 80 and 82.3 in BAU and BCKV respectively. 'Virus threats which can destroy information' stands at second with overall MPS 75.6. It stands fourth in BAU with MPS 74 and in BCKV it stands at third with MPS 77,3. 'Issues regarding privacy' ranked third with overall MPS 74.6. In BAU, this technical constraint ranked second with MPS 75, and BCKV it ranked fifth with MPS 73.3. 'Lack of training' ranked fourth with overall MPS 73.6. It ranked third in BAU with MPS 74.3, and in BCKV it ranked sixth with MPS 73. 'Poor knowledge of software and hardware' stands at sixth position with overall MPS 73. The same ranking pattern has seen in BCKV with fourth rank for MPS 73, following the same trend in BAU it ranked sixth with MPS 73 and in BCKV it ranked fifth with MPS 73.3. 'Limited facilities to repair computers and laptops' stands at fifth position with overall MPS 73.5. The same rank holds by BAU for the same constraints with MPS 73.6 and it ranked fourth in BCKV with 73.6.

and it ranked fourth in BCKV with 73.6. 'Insufficient memory capacity of digital devices' stands at second position with overall MPS 75.6. It ranked seventh in BAU with MPS 72.6 and in BCKV it ranked second with MPS 78 (Table 2).

It is highlighting mostly economical constraints where, 'High initial cost of digital tools' was the major issue faced by the students. It stands at first position with overall MPS 78.8. The same trend shown in both the universities it ranked first with MPS 79 and 78.6 in BAU and BCKV respectively. 'High subscription cost for online courses' ranked second with overall MPS 74.3. It ranked second in both the universities individually with MPS 76 and 72.6 in BAU and BCKV respectively. 'High cost of maintenance of digital devices' stands third with overall MPS 72.3, following the same BCKV also ranked third with MPS 69.6 and BAU ranked fourth with MPS 75. 'High cost of operational software' stands fourth with overall MPS 71.3, it ranked the same in BCKV with MPS 66.3 and in BAU it stands at fifth position with MPS 74. 'High cost of training courses' stands at fifth position with overall MPS 70.6. It ranked the same fifth position in BCKV with MPS 66.3 and in BAU it ranked third with MPS 75.2 (Table 3).

Table 2: Technical constraints faced by the students in use of digital Learning

Sl. No.	Technical Constraints	BAU, Sabour (n1= 60)		BCKV, Mohanpur (n2= 60)		Overall (Total) (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Slow processing speed of device	80	I	82.3	I	81.1	I
2	Virus threats which can destroy information	74	IV	77.3	III	75.6	II
4	Issues regarding privacy	75	II	73.3	V	74.6	III
5	Lack of training	74.3	III	73	VI	73.6	IV
6	Poor knowledge of software and hardware	73	VI	73.3	V	73	VI
7	Limited facilities to repair computers and laptops	73.6	V	73.6	IV	73.5	V

MPS = Mean Percent Score.

Table 3: Constraints in cost of digital devices faced by the students in use of digital learning

Sl. No.	Challenges in cost of digital learning	BAU, Sabour (n1= 60)		BCKV, Mohanpur (n2= 60)		Overall (Total) (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	High initial cost of digital tools	79	I	78.6	I	78.8	I
2	High cost of maintenance of digital devices	75	IV	69.6	III	72.3	III
4	High cost of operational software	74	V	68.6	IV	71.3	IV
5	High cost of training courses	75.2	III	66.3	V	70.6	V
6	High subscription cost for online courses	76	II	72.6	II	74.3	II

MPS = Mean Percent Score.

Table 4: Adaptability challenges faced by the students in use of digital learning

Sl. No.	Adaptability challenges	BAU, Sabour (n_1= 60)		BCKV, Mohanpur (n2= 60)		Overall (Total) (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Digital Learning environment is different from classroom environment	82.3	I	80.66	I	71.5	IV
2	Self-learning feature of digital learning	81	II	77	III	79	II
3	Absence of peer influence in digital Learning	74.6	IV	71	IV	72.8	III
4	Distraction constraints during digital Learning	80.3	III	78	II	79.1	I
5	Problem with non-technical person	68	V	70	V	69	V

MPS = Mean Percent Score.

Table 4 indicating adaptability challenges experienced by students during digital learning. Here it is highlighted that 'Distraction constraints during digital learning' stands at first position with overall MPS 79.1. It ranked third in BAU with MPS 80.3 whereas, in BCKV it ranked second with MPS 78. 'Self-learning feature of digital learning' ranked second with overall MPS 79. The same ranking pattern had seen in BAU with MPS 81, and in BCKV it ranked third with MPS 77. 'Absence of peer influence in digital Learning' stands at third position with overall MPS 72.8. It ranked fourth in both the universities with MPS 74.6 and 71 in BAU and BCKV respectively. 'Digital Learning environment is different from classroom environment' stands at fourth rank with overall MPS 71.5. In BAU it was the most severe adaptability constraints and hence ranked first with MPS 82.3, In BCKV also the trend followed and it ranked first wit MPS 80.66. 'Problem with non- technical person' stands at fifth position with overall MPS 69. It ranked fifth in both the universities with MPS 68 and 70 in BAU and BCKV respectively.

Providing information about mental and physical constraints is experienced by students in digital learning. Here 'The radiation from the screen of devices causing eye irritation, headache etc' was the severe most constraints faced by students to use gadgets with overall 85.33 MPS. In both universities it stands at first rank with 85.6 MPS at BAU and 85 MPS at BCKV. 'Excess use of digital devices affects the sleep cycle' stands at second position with overall MPS 83.3. It ranked second in both the universities second position with MPS 84.6 and 82 in BAU and BCKV respectively. 'Constantly sitting in front of computer causes back pain' stands at third position with overall MPS 81.8. It ranked third in BAU with MPS 84.3 and in BCKV it stands at fifth position. 'Digital Learning can create isolation problem for the students' ranked fourth with overall MPS 81.6. Following the same ranking pattern, it ranked fourth in BAU with MPS 82 and in BCKV it ranked third with MPS 81.33. 'Excess use of Digital learning devices causes irritation, mood swings' stands fifth position with overall MPS 79.6, the same ranking seen in BAU with MPS 79 and in BCKV it ranked fourth with MPS 80.33 (Table 5).

Challenges to be self-motivated during the digital learning course is presented here. Here it is highlighted that 'Difficulties in staying motivated' was the severe constraints faced by the students, and it ranked first position with over all MPS 77.1. The trend followed in both the universities where it ranked first position with MPS 77.6 and 76.6 in BAU and BCKV. 'Lack of appreciation by teacher and peer groups' ranked second position with overall MPS 71.8. It ranked second in BAU with MPS 73.3 and in BCKV it ranked third with MPS 68.33. 'Problem of depression among the students' stands at third position with overall MPS 70.8. The trend followed in BAU with MPS 70 it ranked third and in BCKV it ranked second with MPS 71.66. 'Lack of selfconfidence due to lack of technical knowledge' stands at fourth position with overall 64.3 MPS. It ranked the same second position in both the universities with MPS 64 and 64.6 in BAU and BCKV respectively.

Table 5: Mental & Physical constraints faced by the students in use of digital learning

Sl. No.	Mental & Physical constraints	BAU, Sabour (n1= 60)		BCKV, Mohanpur (n2= 60)		Overall (Total) (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Excess use of Digital learning devices causes irritation, mood swings	79	V	80.33	IV	79.6	V
2	Constantly sitting in front of computer causes back pain.	84.3	III	79.33	V	81.8	III
3	The radiation from the screen of devices causing eye irritation, headache etc	85.6	I	85	I	85.3	I
4	Excess use of digital devices affects the sleep cycle	84.6	II	82	II	83.3	II
5	Digital Learning can create isolation problem for the students	82	IV	81.33	III	81.6	IV

Table 6: Challenges in self-Motivation faced by the students in use of digital learning

Sl. No.	Challenges in self-Motivation	BAU, Sabour (n1= 60)		BCKV, Mohanpur (n2= 60)		Overall (Total) (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Difficulties in staying motivated in course duration	77.6	I	76.6	I	77.1	I
2	Problem of depression among the students	70	III	71.66	II	70.8	III
3	Lack of appreciation by teacher and peer groups	73.3	II	68.33	III	71.8	II
4	Lack of self-confidence due to less of technical knowledge	64	IV	64.6	IV	64.3	IV

MPS = Mean Percent Score.

Table 7: Suggestions to improve digital learning

Sl. No.	Suggestions	BAU, Sabour (n1= 60)			BCKV, Mohanpur (n2= 60)			Overall (Total) (n=120)		
		f	%	Rank	f	%	Rank	f	%	Rank
1	Uninterrupted internet connections to be provided	57	95	I	55	91.6	II	112	93.3	I
2	Providing printers facility along with computers at hostel	46	76.6	IV	52	86.6	III	98	81.6	III
3	Subsidies to students for purchase and maintenance of devices	52	86.6	II	58	96	I	110	91.6	II
4	Arranging training for effective use of computers	26	43.3	VII	40	66.6	VI	66	55	VI
5	Providing power back-up in hostel	31	51.6	V	35	58.3	VII	66	55	VI
6	Time of access the E-resources in the library should be increased	49	81.6	III	48	80	IV	97	80.8	V
7	Providing digital version of important book to related field	30	50	VI	43	71.6	V	73	60.8	V

*f = Frequency; %= Per Cent; *Multiple Response.*

Table 7 revealed university wise comparison and it showed that 'Uninterrupted internet connections to be provided' ranked first as 95 % students of BAU agreed whereas 91.6 % students of BCKV agreed and it ranked second position. 'Providing printers facility along with computers at hostel' ranked fourth as 76.6 % students of BAU agreed, and in BCKV it ranked third as 86.6 % students agreed. 'Subsidies to students for purchase and maintenance of devices' ranked second position as 86.6% students of BAU agreed, whereas in BCKV it ranked first position as 96 % students agreed. 'Arranging training for effective use of computers' ranked seventh position as 43.3 % students of BAU agreed, and it ranked sixth position in BCKV as 66.6 % students agreed. In BAU 51.6 % students agreed on 'Providing power backup in hostel' and got fifth position, and in BCKV 58.3 % students agreed and got seventh rank. 'Time of access the E-resources in the library should be increase' ranked third as 81.6 % students of BAU agreed and in BCKV it ranked fourth as 80 % students agreed. 'Providing digital version of important book to related field' ranked sixth as 50 % students of BAU agreed and in BCKV it ranked fifth as 71.6% students agreed.

CONCLUSION

Digitalization of education is galloping and COVID 19 pandemic pave it further more. Academic institutions prioritize this domain for quality education and more access by students in content and instructors. However, equity in access of digital education across the students is not uniform. Students faced number of barriers. From the study it can be concluded that major challenges agriculture students faced in digital learning were slow processing speed of device, high initial cost of digital tools, high subscription cost for online courses, digital learning environment is different from classroom environment; radiation from the screen of devices causing eye irritation, headache etc; excess use of

digital devices affects the sleep cycle; difficulties in staying motivated in course duration; and lack of uninterrupted internet connections. Digital learning is need of the hour, hence, the problems faced by the students should be overcome and they should be support and trained to cope with the challenges.

REFERENCES

Ansari, J.A.N. and Khan N.A. 2020. Exploring the role of social media in collaborative learning the new domain of learning. Smart Learning Environments, 7(1): 9.

Doddamani, S.S. 2020. Use of Digital device in Academic Achievement by the Post-graduate Students of MPUAT, Udaipur (Rajasthan). International Journal of Current Microbiology Applied Science, 9(9): 1334-1341.

Hussain, I. 2007. A study of student's attitude towards virtual education in Pakistan. Turkish Online Journal of Distance Education, 8(2): 69-79.

Likert, R. 1932. A technique for the measurement of attitudes. Archives of Psychology, 22(140): 55.

Malik, A. and Mahmood, K. 2009. Web search behavior of university students: A case study at University of the Punjab. Webology, 6(2): 1-14.

Jayaratne, K. and Moore, G. 2017. Perceptions of College Students toward Online Classes: Implications for Teaching Online. NACTA Journal, 61(4): 304-309.

Yaghoubi, J., Mohammadi, I.M., Iravani, H., Attaran, M. and Gheidi, A. 2008. Virtual students' perceptions of e-learning in Iran. Turkish Online Journal of Education Technology, 7: 13036521.

Fatty Food Consumption and Its Effects on Liver Health

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ABSTRACT

Fat is essential for health. Some fats are beneficial for health & some are harmful. The type of fat consumed is more important than the amount of fat consumed. This is a review paper where different studies and views of various authors are observed for getting information and stats, many websites like Pubmed, Google Scholars etc and journals by the various author have been referred by the researcher. The consumption of dietary fats and its effect on health. Eating too much and the wrong kinds of fats, such as saturated and trans fat, may rise levels of low-density lipoprotein or LDL, or "bad" cholesterol. Elevated LDL cholesterol in the blood may increase a person's risk of heart disease, obesity, type 2 diabetes and liver disease. Both poly- and monounsaturated fats help in lowering low-density lipoproteins (LDL cholesterol) and subsequently reducing the risk of heart disease. It is recommended to consume a diet that is low in saturated and trans fats, and high in polyunsaturated fats, limiting the intake of most saturated fats and consuming enough unsaturated fats, is the ideal approach to a healthful diet in the long-term. Dietary changes can have unexpected effects on health, especially for people with underlying health conditions and heart problems.

Keywords: *Dietary Fats, Saturated Fats, Trans-Fats, Unsaturated Fats, Nonalcoholic Fatty Liver*

In recent decades, millions of people follow unhealthy lifestyles. Hence they encounter illness, disability and even death. Problems like metabolic diseases, hypertension, overweight, violence and so on, can be caused by unhealthy life style and diet is the greatest factor in lifestyle and has a direct relation with health (Farhud, 2014). Healthcare systems, clinicians have focused on the medical, drug treatment model of disease rather than fundamental root causes such as diet and lifestyles (Micha et al. 2014). In 1961, the average Indian had a daily calorie intake of 2,010. Their daily diet consisted of 43% grains (378 g), 23% plant produce (199 g), 12% dairy & eggs (108 g), 12% sugar and fat (108 g), 2% meat (17g) and 8% as other (68 g). In 2011, the average Indian had a daily calories intake of 2,458. Their daily diet consisted of 34% plant produce (450 g), 32% grains (416 g), 18% eggs and dairy (235 g), 10% sugar and fat (129 g), 2% meat (29 g) and 4% as other (58g s) (Plummer, 2017). The main dietary changes observed have been an increased intake of caloric beverages, ultra-processed products, animal foods, edible oils and soft drinks, accompanied by substantial reductions in the consumption of fruits, vegetables, pulses and milk (Kac and Escamilla, 2013).

A small amount of fat is an essential part of a healthy, balanced diet. Dietary Fat is a source of essential fatty acids, which the body cannot make itself (NHS, 2020) .Fats in the diet helps the body to absorb vitamins and minerals and serve other vital roles. Fats stored in body tissue are critical for the energy storage, metabolism, and the regulations of the body temperature (Tinsley and Felman, 2021). Dietary fats consist of a wide array of polar and non-polar lipids Triacylglycerol (TAG) which is the dominant fat in the diet, its contribute 9095% of the total energy derived from dietary fat. in the diet, and are the main constituent of the body's fat stores (Marshall and Lapsley, 2014). Saturated fatty acids (SFAs) are made up of a carbon chain with no double bonds (Devers and Brown, 2020). Many foods contain saturated fat, especially animal foods such as meat, butter and dairy products, and foods that are made with them, such as cakes and biscuits. They're also found in some plant foods including coconut oil and

palm oil (www. heartuk.org.uk). Trans fatty acids have ≥1 double bond in the trans, rather than cis, configuration, making them structurally more similar to SFAs (Field and Robinson, 2019). Trans-fats exist naturally in small amount in some meats and dairy products. However, they are also artificial added to many foods as partially hydrogenated oil foods with trans-fat are fried foods, margarine, nondairy coffee creamer (Juber, 2022). Monounsaturated fatty acids (MUFAs) have one double bond, and polyunsaturated fatty acids (PUFAs) have more than one double bond. The number of carbon atoms, the number of double bonds, and the places where double bonds are located differ in fatty acids (Kaçar, 2019). Almonds, nuts, walnuts, avocados, olive oil, canola oil are the main sources of MUFA. Mediterranean – style diets with plenty of carbohydrates are rich in unsaturated fatty acids are considered indicative of a healthy diet. (Oz et al. 2022). Polyunsaturated fatty acids including omega -3 and omega-6 fatty acids, are plentiful in fish oils and smaller amounts are present in some meats. (Hage, 2022).

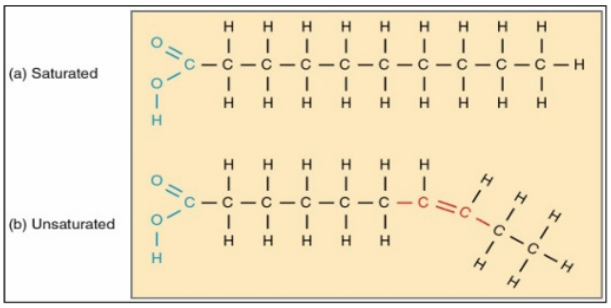

Fig. 1

The effect of fatty acids on health depends on their structure and quantity, plus the balance in relationship to other fatty acids (Powell and Wallace, 2020). The "diet-heart hypothesis", postulated that a higher total dietary fat and saturated fatty acid (SFA) intake leads to an increased incidence of cardiovascular diseases (CVD) by increasing plasma total cholesterol (TC) and low-density lipoprotein–cholesterol (Julibert et al. 2019). Diet rich in saturated fatty acid induce a greater increase in liver fat and insulin resistance compared with isocaloric diets enriched with monounsaturated or polyunsaturated fatty acid (Parks et al. 2017).

Top Dietary Fat Consuming Countries are —

In 2010, global saturated consumption was 9.4%E (95% UI = 9.2 to 9.5); country – specific intakes varied dramatically from 2.3 to 27.5 %E (Micha et al. 2014). According to 2007 estimates, the adult population in Belgium consumed 14.3% of their total calories intake from saturated fatty acids (WHO, 2013). The global Trans fatty acid consumption in 2010, ranging from 0.2% to 6.5% of energy intake (Downs et al. 2017). In the UK, A considerable number of adolescents have intakes approximately 17% energy that may increase their risk of heart disease. Main sources of saturated fat in the adolescent diet include meat and meat products (approximately 20%), savory snacks and fried foods (Ruxton and Derbyshire, 2013).

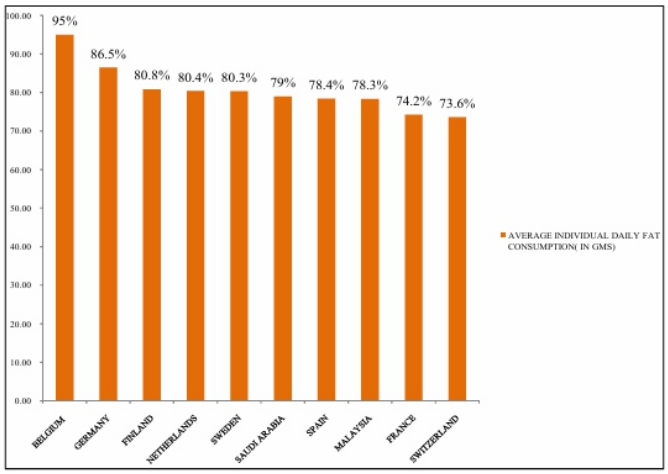

Fig. 2: World atlas top fat consuming countries in the world march 2019

The average consumption of trans fat globally was estimated to be 1.4% of total energy in 2010, ranging from 0.2 to 6.5% of total energy across countries (0.123 to 4.3 grams per day for a 2,000-calorie diet) (WHO, 2018). The high fat diets induce greater food intake and weight gain then high carbohydrate diets (Agolay et al. 1997). According to WHO in 2019, an estimated 38.2 million children under the age of 5 years were overweight or obese. The prevalence of overweight and obesity among children and adolescents aged 5-19 has rise dramatically from 4% in 1975 to 18% in 2016. In 2016 more than 1.9 billion adults, 18 years and older were overweight. Of these over 650 million were obese (WHO, 2021). Nearly 3 in 4 adults age 20 or older in the United States have either overweight or obesity. Nearly I in 5 children and teens ages 2 to 19 years have obesity (NIH, 2022). More than135 million individuals were affected by obesity in India.

According to ICMR-INDIAB 2015, prevalence rate of obesity and central obesity are varies from 11.8% to 16.95% -31.3% respectively (Ahirwar and Mondal, 2019). Obesity or overweight is seen in 30-65% of the adult urban population. Body Mass Index(BMI) of urban Indians are higher (approximately 24-25) as compared with that of rural population (BMI of about 20) (Kumar and Sinha, 2020).

Saturated fat intake has been linked to an increased risk of cardiovascular disease, and this effect is thought to be mediated primarily by increased concentrations of LDL cholesterol (Tarino et al. 2010). CVDs caused by disorders of the hearth and blood vessels, are the leading cause of death globally. It is estimated that 17.7 million people, which are represented 31% of all global deaths, died from CVDs in 2015 (Zhu et al. 2019). Heart attack and stroke are the biggest killers in Belgium and affect a significant part of the Belgium population. They accounts for 12% & 7% of all deaths respectively. (hpolicy. co/secondaryprevention, 2021). In 2016 India reported 63% of total deaths due to non-communicable diseases, of which 27% were attributed to CVDs. CVDs also account for deaths in the 40-69 year age group (WHO, 2023). Within India, the rates of CVD vary markedly with highest in states of Kerala, Punjab and Tamil Nadu. Moreover, these states also have the highest prevalence of raised cholesterol level and blood pressure (Kumar and Sinha, 2020). According to International Diabetes Federation in 2021, Approximately 537 million adults (20-79 years) are living with diabetes. More than 1.2 million children are adolescents (0-19 years) are living with type-1 diabetes (IDF, 2021). According to IDF, China (116 million), India (77 million), and the United States of America (31 million) are the countries

with the highest numbers of people living with diabetes (Saeedi et al. 2019). The number of people with diabetes rose from 108 million in 1980 to 422 million in 2014 (WHO, 2022). Dietary pattern with lower average intakes of saturated fatty acids are associated with favorable cardiovascular outcomes (Kevin et al. 2021). The intake of high fat during the latter part of the third trimester of pregnancy may have long lasting impact on the baby's gut micro biome. The analysis showed that the mother's dietary intake of calories from fat ranged from 14.0% to 55.2% per day. On an average, the daily intake of calories from fat was 33.1%. The Institute of medicine in the USA recommends the daily fat intake between 20% and 30% (Johanna, 2016).

The liver plays a major role in metabolic regulation of dietary nutrients including fat and carbohydrates. When fatty acids exceed the liver's capacity for removal (i.e., via secretion or oxidation pathways) they are stored as triglyceride (Green and Hodson, 2014). Overeating saturated fat from palm oil causes pronounced liver fat accumulation. In contrast, despite similar weight gain overeating polyunsaturated fatty acids from sunflower oil completely blocked liver fat accumulation, & even improved the blood lipid profile (Rosqvist et al. 2019). Excess fat which is deposited in the liver cause Nonalcoholic fatty liver (NAFLD). The prevalence of NAFLD in India is about 9% to 32% (National Health Portal, 2021). Hepatic fat accumulation can progress into advanced stages of liver disease such as non alcoholic steatohepatitis (NASH), liver cirrhosis, and hepatocellular carcinoma (Wernicke et al. 2023). Liver cirrhosis is leading cause of mortality and morbidity across the world. It is the 11th leading cause of death and 15th leading cause of morbidity. NAFLD has 24% estimated global prevalence rate, and it is more than 30% in the middle east and South America (Cheemerla and balakrishnan, 2021). NAFLD affects about 25% of the global adult population ranging from 13.5% in Africa to 31.8% in the Middle East (www.nhp.gov.in, 2021). According to a 2017 research review, NAFLD affects up to 25 to 30 percent of people in the United States and Europe (Sethi, 2023). Liver cancer is the 16th leading cause of death (Asrani et al. 2019). The burden of liver disease in India is significant because is alone contributed to 18.3% of the two million global liver disease related deaths in 2015 (Mondal et al. 2022). The effect of fat intake on NAFLD development depends on the type of fat. Same fats (MUFA and PUFA) protect against NAFLD wheras others (SFA and TFA) have a negative effect on NAFLD (Lujan et al. 2020). It is estimated that 3% to 7% of the US population has NASH (Armand, 2022).

Lifestyle includes many distinct elements of everyday life. Examples of lifestyle modification are numerous, and include, apart from eating and drinking, physical activity, weight reduction, smoking, and stress (Vlachopoulos and Xaplanteris, 2015). Change in lifestyles, especially diet, has been shown to prevent or delay the onset of T2DM and its complications. Dietary management during the prediabetic stage involves significant changes in planning meals, selection and preparation of food, portion control, and eating away from home, which means most people struggle to comply (Zoidis et al. 2016). One large prospective trial of 261 patients followed for 12 months demonstrated that all features of NASH improved with weight loss of at least 10%, and fibrosis stabilized or improved with weight loss of at least 5%. Similarly, a meta-analysis of 8 randomized controlled trials suggested a weight loss of at least 5% resulted in improvement in hepatic steatosis, and weight loss of at least 7% improved the NASH (Feldman et al. 2021). The main goal of lowfat diets is to reduce the number of calories from fat. Some strategies are very low-fat, with calories from fat comprising less than 10% of total calories, while others are more moderate, with calories from fat comprising less than 30% of daily caloric intake (Baik and Bird, 2022). The WHO Healthy Diet Fact Sheet advises that "unsaturated fats are preferable to saturated fats". This advice is echoed by 29% of countries having key message that indicate preference for unsaturated over saturated fats (e.g., "Limit intake of solid fats and replace with vegetable oils":

Lebanon) (Herforth et al. 2019).

The report, written on behalf of the Global Burden of Diseases Nutrition and Chronic Diseases Expert Group, was published online April 15, 2014 in the British Medical Journal (BMJ).

Between 1990 and 2010, global saturated fat, dietary cholesterol, and trans fat intakes remained stable, while omega 6, seafood omega 3, and plant omega 3 fat intakes each increased.

In 2010, global saturated fat consumption averaged 9.4%; country-specific intakes varied dramatically from 2.3 to 27.5%. The world's highest consumption of saturated fat in adults in 2010 was in Samoa, Kiribati, and similar palm oil producing island nations, as well as Sri Lanka, Romania, and Malaysia. The lowest intake was in Bangladesh, Nepal, Bolivia, Bhutan, and Pakistan.

Country-specific consumption of trans fat ranged from 0.2 to 6.5% (global mean: 1.4%) for trans fat; and for dietary cholesterol, from 97 to 440 mg/day (global mean: 228 mg/day).

Globally, the average intake of seafood omega 3's was 163 mg/d, but with tremendous national variation from 5 to 3,886 mg/d. Highest intakes were identified in island nations including Maldives, Barbados, the Seychelles, and Iceland; as well as in Malaysia, Thailand, Denmark, South Korea, and Japan. 100 nations had very low consumption (<100 mg/d), generally in Sub-Saharan African and Asian regions as well as North Africa and the Middle East, representing 3 billion adults and 66.8% of the world's adult population

A standard low fat diet contains about 30% or less of its calories from fat. Here are a few examples of suggested daily fat ranges for a low fat diet, based on different calorie goals:
1,500 calories: about 50 grams of fat per day
2,000 calories: about 67 grams of fat per day
2,500 calories: about 83 grams of fat per day

The 2015-2020 Dietary Guidelines for Americans recommends limiting calories from fats to less than 10% of the total calories. That's about 200 calories for a 2,000 calorie diet (Dietary Guidelines For Americans, 20152020) According to the institute of Medicine's food and nutrition board on acceptable macronutrient distribution range for fat, the suggested goal is to maintain a total dietary fat intake of 20 to 35 percents for adults, 30 to 40 percent for children ages 1 to 3, and 25 to 35 percent for children ages 4 to 18 (Schere et al. 2023). Total fat should not exceed 30% of total energy intake. Intake of saturated fats should be less than 10% of total energy intake, and intake of trans-fats less than 1% of total energy intake, with a shift in fat consumption away from saturated fats and trans-fats to unsaturated fats, and towards the goal of eliminating industrially-produced trans-fats (WHO, 2018).The American Heart Association recommends aiming for a dietary pattern that achieves 5% to 6% of calories from saturated fat. For example, if body needs about 2,000 calories a day, no more than 120 of them should come from saturated fat. That's about 13 grams of saturated fat per day (American Heart Association).

Fig. 3: Recommendations for dietary fat intake in Indians

Age/Gender/ physiological groups	Physical activity	Minimum level of Total fat (% E)	Minimum level* of fat from foods other than visible fats[d] % E	Visible fat	
				% E	g/p/d
Adult Men	Secondary				25
	Moderate	20	10	10	30
	Heavy				40
Adult Women	Secondary				20
	Moderate	20	10	10	25
	Heavy				30
	Pregnant women	20	10	10	30
	Lactating women				30
Infants	0-6 m	40-60	Human milk		
	6-24	35	10[c]	25	25
Children	3-6 y	25	10	15	25
	7-9 y				30
Boys	10-12 y				35
	13-15 y				45
	16-18 y				50
Girls	10-12 y				35
	13-15 y				40
	16-18 y				35

**if higher than 10% E, visible fat requirement proportionately reduces; (ICMR – NIN, 2020).*

Fish and marine n-3 fatty acid consumption among Asian populations was associated with a decreased risk for type 2 diabetes, consumption of these among western Europeans and Americans was associated with increased of the disease (Bardley, 2018).

Eating foods higher in monounsaturated fat compared to food higher in saturated fat may have some benefits in the context of a moderately high carbohydrate intake-46% of total calories from carbohydrates, where replacing saturated fats with monosaturated might lead to less body fat gain (DiNicolantonio et al. 2022). In May 2018, the Health Assembly approved the 13th General Programme of Work (GPW13), which will guide the work of WHO in 2019–2023. Reduction of salt/sodium intake and elimination of industrially-produced transfats from the food supply are identified in GPW13 as part of WHO's priority actions to achieve the aims of ensuring healthy lives and promote well-being for all at all ages (WHO).

The nutrition labels on the food packaging can help to cut down on total fat and saturated fat.

Total fat- High fat; more than 17.5 g of fat per 100 g. Low fat; 3 g of fat or less 100 g, or 1.5 g of fat per 100 ml for liquids. Fat –free; 0.5 g of fat or less per 100 g or 100 ml.

Saturated fat- High saturated fat- more than 5 g of saturates per 100 g. Low saturated fat- 1.5 g of saturates or less per 100 g or 0.75 g per 100 ml for liquids. Saturated –fat – free; 0.1 g of saturates per 100 g or 100 ml.

Lower fat-For a product to be labeled lower fat, it must contain at least 30% less fat than a similar product. If the type of food in question is usually high in fat, the lower fat version may still be a high – fat – food (17.5 g or more of fat per 100 g) (www.nhs.uk.2022).

OBJECTIVE

The consumption of dietary fats and its effect on health.

METHODOLOGY

This is a review paper where different studies and views of various authors are observed for getting information and stats, many websites like Pubmed, Google Scholars etc and journals by the various author have been referred by the researcher.

DISCUSSION

Worldwide non-communicable diseases, such as cardiovascular disease, cancer and type 2 diabetes account for more than 70% of total death. Cardiovascular diseases remain the leading cause of disease burden in the world. According to the International Diabetes Federation more than 500 million adults are living with diabetes. Up to 4% of the global disease burden has been related to an unhealthy diet, making diet one of the important modifiable lifestyle factors. Over several decades, dietary habits have changed dramatically around the world. Globalization and urbanization have paved the way for a rise in convenience food and drinks products, junk food, and eating out. Junk foods are food that lacks nutrients, vitamins and minerals, and are high in salts, sugar, and fats. Small amount of fat or dietary fat is essential part of a healthy, balanced diet. Fat helps the body absorb Vitamin A, Vitamin D and Vitamin E. These vitamins are fat-soluble, which means they can only be absorbed with the help of fats. The types of fats have different chemical structures and physical properties. The "bad fats", saturated and trans-fats tend to be more at solid room temperature. Monounsaturated and polyunsaturated fats tend to be more liquid. Saturated fatty acids (SFAs) are made up of a carbon chain with no double bonds. They are mainly obtained through dietary intake of animal fats like beef, cheese, and ice cream but a few plant foods are also high in saturated fats, such as palm oil, palm kernel oil and coconut oil. 92% saturated fat is present in coconut oil. Trans fats is considered the worst type of fat to eat. Trans-fats are formed through an industrial process that adds hydrogen to vegetable oil, which causes the oil to become solid at room temperature. According to WHO (2018) high intake of trans fats increase the risk of death from any cause by 34% and from coronary heart disease by 28%. The average consumption of trans-fat globally was estimated to be 1.4% of total energy in 2010, ranging from 0.2 to 6.5% of total energy across countries. Approximately 540,000 deaths each year can be attributed to intake of industrially produced transfatty acids. Mother's high – fat diet may have a lasting impact on babies gut micro biome. Changes in the baby's gut micro biomes were present from birth to six weeks of age. The changes in gut micro biome may affect the baby's immune development (Johanna, 2022). Diet rich in saturated fatty acid induce a greater increase in liver fat .The liver plays a major role in metabolic regulation of dietary nutrients including fat and carbohydrates. The accumulation of fat within the liver represents an imbalance between the amount of fatty acids entering the liver (input), fatty acids synthesis within the liver and fatty acid disposal from the live (output). The excess deposition of fat in liver is the cause of Nonalcoholic fatty liver disease (NAFLD). NAFLD is currently recognized as the most prevalent form of liver disease world-wide, estimated to affect 25% of the global population. The highest prevalence of is reported from the Middle East with 31.79%, followed by South America with 30.45% and the least prevalent rate is Africa with 13.48% (Armandi and Bugianesi, 2021). Hepatic fat accumulation can progress into advanced stages of liver disease such as non alcoholic steato hepatitis (NASH), liver cirrhosis, and hepato cellular carcinoma. It is estimated that 9% 32% of general population in India has NAFLD and among them nearly 31% are diagnosed with NASH (National Health Portal, 2021). NAFLD is frequently linked to metabolic syndrome, which includes diabetes, hyper lipidemia, obesity, hypertension, etc. Increase in LDL cholesterol levels is associated with an increased risk of cardiovascular diseases. Since saturated fat increases LDL cholesterol while unsaturated fat decreases

it, replacing saturated fat with unsaturated fat will lower the risk of these diseases. Monounsaturated fatty acids (MUFAs) are found in olive oil, avocados and nuts. A decreased risk of metabolic syndrome and/or cardiovascular disease has been evidenced with a higher Monounsaturated fatty acids consumption. Essential polyunsaturated fatty acids include omega-3 Poly unsaturated fatty acids and omega-6 Polyunsaturated fatty acids. The latter are mostly found in vegetable oils (canola and cottonseed), cereal grains (wheat, maize and rice) and nuts. Linoleic acid is the main dietary omega-6 Poly unsaturated fatty acids. All types of fat are high in energy. A gram of fat, whether it's saturated or unsaturated, provides 9kcal (37kj) of energy compared with 4kcal (17kj) for carbohydrate and protein. All packaged foods have a nutrition label that includes fat content. Reading food labels can help to keep track. As a guide, when comparing or readings labels then 5% of daily value from fats is low and 20% of daily value from fats is high (WWW.NHS.UK, 2020).

CONCLUSION:

After reviewing many articles it was decided that fat is essential for health. Some fats are beneficial for health like MUFS and PUFA & some are harmful like saturated fat and trans fats. Many foods contain saturated fat, especially animal foods such as meat, butter and dairy products, and foods that are made with them, such as cakes and biscuits. They're also found in some plant foods including coconut oil and palm oil. Unsaturated fats are predominantly found in foods from plants, such as vegetable oils, nuts, and seeds. Saturated fat may increase levels of low-density lipoprotein or LDL, or "bad" cholesterol. Elevated LDL cholesterol in the blood may increase a person's risk of heart disease. Other than cardiovascular disease saturated fat can also cause obesity, type 2 diabetes and liver disease. Both poly- and monounsaturated fats help in lowering low-density lipoproteins (LDL cholesterol) and subsequently reducing the risk of heart disease. Some consider polyunsaturated fats as being marginally better for their health. To reduce the risk of liver disease and other health problems associated with fatty food consumption. It is recommended to consume a diet that is low in saturated and trans fats, and high in polyunsaturated fats, limiting the intake of most saturated fats and consuming enough unsaturated fats, such as plant oils, avocado, and fish, is the ideal approach to a healthful diet in the long-term. Dietary changes can have unexpected effects on health, especially for people with underlying health conditions and heart problems.

REFERENCES

Ahirwar, R. and Mondal, P.R. 2019. Prevalence of obesity in India: A systematic review. Diabetes Metab. Syndrome, 13(1): 318-321.

Asrani, S.K., Devarbhavi, H., Eaton, J. and Kamath, P.S. 2019. Burden of liver diseases in the world, Journal of Hepatology, 70(1): 151-171.

Baik, D. and Bird, K. 2022. Dietary Lifestyle Changes StarPearls, Nov 27.

Beth H. Rice Bradley, 2018. Dietary Fat and Risk for Type 2 Diabetes: a Review of Recent Research. Current Nutrition Reports, 7(4): 214-226.

Catherine J Field and Lindsay Robinson, 2019. Dietary Fats, Dietary Fats Advances In Nutrition, 10(4): 722–724.

Charalambos Vlachopoulos, Panagiotis Xaplanteris, Lifestyle Intervention: What Works? Early Vascular Aging (EVA), https:// doi.org/10.1016/B978-0-12-801387-8.00026-0. (https://www.sciencedirect.com/science/article/pii/B9780128013878000260)

Charlotte J. Green and Leanne Hodson, 2014. The Influence of Dietary Fat on Liver Fat Accumulation

Nutrients, 6(11): 5018 5033.
Cheemerla, S. and Balakrishnan, M. 2021. Global Epidemiology of Chronic Liver Disease. Clinical Liver Disease (Hoboken), 17(5): 365-370.
Dariush D. Farhud, 2015. Impact of lifestyle on Health, Iran Journal of Public Health, 44(11): 1442-4.
Dietary guidelines for Americans 2015-2020 Cut Down on Saturated Fats 2016 Dec Downs, S.M., Bloem, M.Z., Zheng, M., Catterall, E., Thomas, B., Veerman, L. and Wu, J.H. 2017. The Impact of Policies to Reduce trans Fat Consumption: A Systematic Review of the Evidence, Current Developments in Nutrition, 1(12): cdn.117.000778.
Fat : the facts, WWW.NHS.UK, April 2020, (https://www.nhs.uk/ live-well/eat-well/food-types/different-fats-nutrition/) Food labels, www.nhs.uk,16 September 2022, (https://www.nhs. uk/live-well/eat-well/food-guidelines-and-food-labels/howto-read-food-labels/)
Franziska Spritzler and Jillian Kubala 2020. Fat grams – how much fat should you eat per day ? www.healthline.com 2020 October Golay, A. and Bobbioni, E. 1997. The role of dietary fat in obesity, Int. J. Obes. Relat. Metab. Disord., 3: S2-11.
Grant Tinsley and Adam Felman, 2021. Is saturated or unsaturated fat better for health? Medical News Today, Updated on Jan 27.
Herforth, A., Arimond, M., Álvarez-Sánchez, C., Coates, J., Christianson, K. and Muehlhoff, E. 2019. A Global Rev. FoodBased Dietary Guidelines, Advances in Nutrition, 10(4): 590-605.
International Diabetes Federation, Diabetes facts & figures, 19 Dec 2021 (https://idf.org/aboutdiabetes/what-is-diabetes/factsf igures.html)
Jahangir Iqbal and Mahmood Hussain, M. 2009. Intestinal Lipid Absorption. American Journal of Endocrinology and Metabolism, 296(6): E1183-94.
James J. Di Nicolantonio and James H. O'Keefe, 2022. Monounsaturated Fat vs Saturated Fat: Effects on CardioMetabolic Health and Obesity. Missouri Medicine, 119(1): 69-73.
Julibert, A., Bibiloni, M.D.M., Mateos, D., Angullo, E. and Tur, J.A. 2019. Dietary Fat Intake and Metabolic Syndrome in Older Adults, Nutrients, 11(8): 1901.
Kac, G. and Pérez-Escamilla, R. 2013. Nutrition transition and obesity prevention through the life-course, International Journal Of Obesity Supplements, 3(Suppl 1): S6–S8.
Lahnor Powell, Edward C. Wallace, Fatty Acid Metabolism, Textbook of Natural Medicine (Fifth Edition), doi: https:// doi.org/10.1016/B978-0-323-43044-9.00079-0, (https://www. sciencedirect.com/science/article/pii/B9780323430449000790)
Lucy Plummer, 2017. 50 Years of food in India: Changing Eating Habits of a Rapidly Changing Nation (of Foodies), The Better India, May 2.
Mahammad Juber, 2022. Foods High in Trans Fat, WebMD. Maki Kevin, C., Dicklin, M.R. and Kirkpatrick, C.F. 2021. Saturated fats and cardiovascular health: Current Evidence and controversies, Journal of Clinical Lipidology, 15(6): 765-772.
Marge Dwyer, Report compares dietary fat intake among countries, www.hsph.harvard.edu, April 17 2014, (https://www.hsph. harvard.edu/news/features/report-outlines-dietary-fat-intakeamong-266-countries/) Mondal, D., Das, K. and Chowdhury, A. 2022. Epidemiology of Liver Diseases in India, Clinical Liver Disease (Hoboken), 19(3): 114–117.
Mustafa Öz, İlknur Ucak, Gulzar Ahmad Nayik, 2022. PUFA and MUFA, Nutraceuticals and Health Care, https://doi. org/10.1016/B978-0-323-89779-2.00004-1, (https://www. sciencedirect.com/science/article/pii/B9780323897792000041)
Nadia El-Hage, Scialabba, 2022. Livestock food and human nutrition Managing Healthy Livestock Production and Consumption, https://doi.org/10.1016/B978-0-12-8230190.00012-X. (https://www.sciencedirect.com/science/article/pii/ B978012823019000012X)

National Health Portal, Nonalcoholic fatty liver disease (NAFLD), Apr 04, 2021, (https://www.nhp.gov.in/disease/ non-communicable-disease/nonalcoholic-fatty-liver -diseasenafld) 24,

National Institutes of Health, What Are Overweight and Obesity? March 2022, overweight-and-obesity) (https://www.nhlbi.nih.gov/health/ Parks, E., Yki-Järvinen, H. and Hawkins, M. 2017. Out of the frying pan: dietary saturated fat influences nonalcoholic fatty liver disease, Journal of Clinical Investigation, 127(2): 454-456.

Patricia M. Devers, Warren M. Brown, 2020. Fatty Acid Profiling, Textbook of Natural Medicine (Fifth Edition), https:// doi.org/10.1016/B978-0-323-43044-9.00013, (https://www.sciencedirect.com/science/article/pii/B9780323430449000133)

Shirley Johanna, 2016. High – fat Diet during Pregnancy may affect Baby's Gut Microbiome Medindia, August-2016.

Renata Micha, Shahab Khatibzadeh, Peilin Shi, Saman Fahimi, Stephen Lim, Kathryn G Andrews, Rebecca E Engell, John Powles, Majid Ezzati, Dariush Mozaffarian, 2014. Global, regional, and national consumption levels of dietary fats and oils in 1990 and 2010: A systematic analysis including 266 country-specific nutrition surveys, The British Medical Journal, 348.

Rosqvist, F., Kullberg, J., Ståhlman, M., Cedernaes, J., Heurling, K., Johansson, H.E., Iggman, D., Wilking, H., Larsson, A., Eriksson, O., Johansson, L., Straniero, S., Rudling, M., Antoni, G., Lubberink, M., Orho-Melander, M., Borén, J., Ahlström, H. and Risérus, U. 2019. Overeating Saturated Fat Promotes Fatty Liver and Ceramides Compared With Polyunsaturated Fat: A Randomized Trial, Journal of Clinical Endocrinology and Metabolism, 104(12): 6207-6219.

Ruxton, C.H.S. and Derbyshire, E. 2013. Adolescents: Requirements for Growth and Optimal Health Encyclopedia of Human Nutrition (Third Edition), https://doi.org/10.1016/ B978-0-12-375083-9.00003-9. (https://www.sciencedirect.com/ science/article/pii/B9780123750839000039)

Saeedi, P., Petersohn, I., Salpea, P., Malanda, B., Karuranga, S., Unwin, N., Colagiuri, S., Guariguata, L., Motala, A.A., Ogurtsova, K., Shaw, J.E., Bright, D., Williams, R. 2019. IDF Diabetes Atlas Committee. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. Diabetes Research and Clinical Practice, 157: 107843.

Saturated Fat, AMERICAN HEART ASSOCIATIONS (https:// www.heart.org/en/healthy-living/healthy-eating/eat-smart/ fats/saturated-fats), Nov 1, 2021

Saturated fat, www.heartuk.org/low-cholesterol-foods/saturatedfat Secondary prevention of heart attack and stroke Country Profile for Belgium, 2021, (https://www.healthpolicypartnership.
com/app/uploads/Secondary-prevention-of-heart-attack-andstroke-in-Europe-Belgium.)

Semra Kacar, 2019. n-3 and n-6 fatty Acids in fish: A Focus on Non-Marine Species Science Direct, 11 July 2019.

Sethi, S. 2023. What to Know About Fatty Liver Disease, https:// www.healthline.com/health/fatty-liver, Feb 8.

Siri-Tarino, P.W., Sun, Q., Hu, F.B. and Krauss, R.M. 2010. Saturated fatty acids and risk of coronary heart disease:
modulation by replacement nutrients, Current Atherosclerosis Reports, 12(6): 384-90.

Sreeniwas Kumar, A. and Sinha, N. 2020. Cardiovascular disease in India: A 360 degree overview. Medical Journal Armed Forces India, 76(1): 1-3.

Vancells Lujan, P., Viñas Esmel, E. and Sacanella Meseguer, E. 2021. Overview of Non-Alcoholic Fatty Liver Disease (NAFLD) and the Role of Sugary Food Consumption and Other Dietary Components in Its Development. Nutrients, 13(5): 1442.

Wernicke, C., Pohrt, A., Pletsch-Borba, L., Apostolopoulou, K., Hornemann, S., Meyer, N., Machann, J., Gerbracht, C., Tacke, F., Pfeiffer, A.F., Spranger, J. and Mai, K. 2023. Effect of unsaturated fat and protein intake on liver fat in people at risk of unhealthy aging: 1-year results of a randomized controlled trial. American Journal of Clinical Nutrition, 13: S00029165(23)00514-2.

WHO, Cardiovascular diseases, 2023. WHO, Diabetes, 16 September 2022 WHO, Nutrition: Trans fat, 3 May 2018 WHO, Obesity and overweight, 9 June 2021.

William J. Marshall, Marta Lapsley, 2014. Uses of biochemical data in clinical medicine, Clinical Biochemistry: Metabolic and Clinical Aspects (Third Edition) https://doi.org/10.1016/ B978-0-7020-5140-1.00001-8. (https://www.sciencedirect.com/ science/article/pii/B9780702051401000018)

WORLD ATLAS, Top fat consuming countries in the world 2019 World Health Organization European Region Nutrition, Physical Activity and Obesity Belgium, 2013

Wynne Armand, Fatty liver disease: What it is and what to do about it, Harvard Health Blog, (https://www.health.harvard. edu/blog/fatty-liver-disease-what-it-is-and-what-to-do-aboutit-2019011015746), April 14, 2020

Zhu, Y., Bo, Y. and Liu, Y. 2019. Dietary total fat, fatty acids intake, and risk of cardiovascular disease: a dose-response metaanalysis of cohort studies. Lipids Health Disease, 91.

Zoidis, E. and Papamikos, V. 2016. Glucose: Glucose Intolerance Encyclopedia of Food and Health, https://doi.org/10.1016/ B978-0-12-384947-2.00352-4. (https://www.sciencedirect.com/ science/article/pii/B9780123849472003524)

Factors Associated with Rural Agriculture Work Experience (RAWE) Programme: An Impact

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ABSTRACT

The papers focused on impact on students and farmers skills under the RAWE programme under the CCS Haryana Agriculture University Hisar. The study found that motivation needs which were varied towards students motivation skills. Thus, the factors are found to be responsible to assess an impact on students' skills and impact on farmers. To get a clearer spectrum of the study associated factors taken to measure the impact during RAWE. It was found under intrinsic motivation majority (70%) of students found that learning and experience ideas was considered to be the most vital factor that secure (2.39) mean score value followed by (60%) believed to do well and show good result secured (2.20) mean value. While (70%) select the CCSHAU due to interest in agriculture with mean value (2.35). However, (70%) students using local language with farmers secured mean value (2.14) in case of students' self-exploration. Study revealed that under extrinsic motivation majority (75%) students found to highly motivated on the statement concerning welfare to get good feedback which secured (1.67) mean, avoid working what else to do (75%) with (1.67) mean value, where (60%) students had medium level of motivation on the statement believed to be motivated (15%) with (2.14) mean value towards extrinsic motivation. Eventually more than (60%) students having medium level of motivation concerning on the statement students enjoy and interest due to village view with (1.82) mean value, (70%) having low level of motivation show very little performance with mean value (1.71) respectively.

Keywords: *Agriculture, Assessment, Factors, Impact and Motivation*

The value of agricultural education has been significantly diminished, according to Dr. Radhakrishnan, one of India's most esteemed educators. This holds true for all agricultural professionals, not just extension personnel. In order to integrate direct engagement and experience with agricultural life and practice, agricultural education should be provided in a rural context. The Third Deans committee under the chairmanship of Keerti Singh advocated the introduction of RAWEP in all the State Agricultural Universities (SAU's) in India and laid down specific objectives for the programme (Shivaramu, 2018). It sharpen the knowledge and skills of agricultural students, RAWE is being offered in final year of the B.Sc. (Agri.) degree programme which includes, training, demonstration, observation, practice and participation in purposeful activities and to orient our agricultural graduates for participation in various rural activities.. This experiential system in agricultural education has a strong potential to prepare a better agricultural technocrats with improved skill in combination with the modern out-look and management (Kumar et al. 2020). The main objective of the village stay module is to equip the students to plan and organize appropriate extension programs based on the local farming problems in the village and to prepare an integrated agricultural development plan of a village/ Panchayath (Sreenath, P. and Sreedaya). It is observed that farmers need and their impact on students as well as on farmers. He also observed an exploration to observe the people's need in order to improve their living conditions in human environment. As we know that "No men is an Island unto himself in the Society".

In addition to this social grouping, association belonging which are depending on emotional sense are needed to enhance different social setting. Such needs were observed during RAWE and impacted the students and farmers. The confirmation was made to known in case of students needs by establishing the communication and ways and means of life during RAWEP (Aruma and Enwuvesi Hanachor, 2017). The present research study is conducted to identify the perception of farmers towards village stay program and identify the contribution of each of the components, to study the extent of the utility of development plans submitted to the respective panchayaths as perceived by the peoples' representatives, constraints felt by the students and to suggestions suitable modifications (Sreenath, P. and Sreedaya).

MATERIALS AND METHODS

The present investigation was carried out in CCS Haryana Agricultural University, Hisar as well as villages allotted under RAWEP. Thus, 260 host farmers and 120 students were selected as sample size with whom the students interacted to know the impact viz. rural life, agricultural practices, adoption rate of different seed varieties and technology and new farm enterprise. For the calculation of the data descriptive research design was applied for carrying out the study in the state of Haryana. Further, data was collected with help of questionnaire of measuring within face to face contact with the farmers. In formulating the question and setting the particulars' the investigator has taken opinion and guidance of the experts and extension personals. While, collected data was analyzed and tabulated by using the frequency and percentage.

RESULTS AND DISCUSSION

In section result and discussion the result from the survey conducted. In case of this descriptive statistic research have been used as mentioned in methodology to analysis the students needs with respect to RAWE. The total weighted mean score and rank order of the levels of need have been used.

The data presented in the Table 1 students need were seen as being motivated to a certain extent on the statement of "Select CCSHAU due to interest in agriculture" secured first rank with mean score (2.35) followed by learning and exploring ideas" secured 2nd rank with mean score (2.35). While maximum responded reported that believed to do well and show good result secured 3rd rank with their mean score (2.20) remaining using local language with farmers was ranked 4th with least mean score (2.14) in respect to intrinsic motivation.

The data presented in the Table 1 majority of the students need were seen as being de-motivated up to certain extent on the statement "believed to be de-motivated" secured first rank with highest mean score (2.14), maximum respondents observed that "concerning welfare get good feedback" and "avoid working what else to do" (1.67) were secured 2nd rank with same mean score in both cases. It is indicated that during RAWEP students worked on prominent issues of farmers instead left the causes which may affected their need at village's level as being extrinsic motivation.

Table 1: Distribution of the respondents according to impact on motivational skill (n = 140)

Sl. No.	Impact on motivation skill	High motivation (3)	Medium Motivation(2)	Low motivation(1)	Total weighted score	Total weighted meanscore	Rank order
1.	**Intrinsic**						
(A)	**Self-exploration**						
i.	Learning and exploring ideas	70	45	25	325	2.32	II
ii	Believed to do well and showgood result	60	48	32	308	2.20	III
iii	Select CCSHAU due tointerest in agriculture	70	50	20	330	2.35	I
iv.	Using local language withfarmers	70	20	50	300	2.14	IV
2.	**Extrinsic**						
(A)	**Rejection of Alternative Options**						
i.	Concerning welfare get good feedback	75	45	70	235	1.67	II
ii.	Avoid working what else todo	75	45	70	235	1.67	II
iii	Believed to be de-motivated	15	60	30	300	2.14	I
(B)	**Social Enjoyment**						
i.	Students enjoy and interactdue to village view	28	60	52	256	1.82	I
ii.	Show very little performance	30	40	70	240	1.71	II

The data presented in the Table 1 mostly students love and social enjoyment/belongingness were observed as being motivated at some limitation on the statement of "students enjoy and interact due to village view" secured highest mean value (1.82) with 1st rank followed by "show very little performance" secured mean value (1.71) with 2nd rank. It is cleared that students were found to be enthusiastic/motivated in establishing the communication with farmers but due to some reason like literacy students were faced problems in expressing their knowledge. According to similar study (Mehta, 2021) this is the Maslow (1943) has observed when the level of need found to be satisfied it can shift to the next paradigm. As per level of students their lower needs are not being met and hence are not able to move up during RAWEP. Mentioned above particular/statements selection of CCSHAU due to interest in agriculture got highest weighted mean value which means students were having intrinsic motivation. It also resulted that during RWAEP students used local language with lowest weighted mean value that indicates students and farmers faced communication problems. Study revealed that (Handage and Chander, 2021) among the students' capabilities as a motivation towards their surrounding and their study at a particular institute or university cannot develop a single competency in students; all trays to develop an array of capabilities. It is discovered that influencing motivation factors of students bring in betterment during RAWEP.

The data presented in the Table 2 majority of the respondents (85 %) having significant impact on "improve fraternity among farmers" followed by (80.8%) also having significant impact on "gained knowledge of agriculture schemes" remaining (82.50%) impacted towards "introduce the utility of fertilizers weeds and herbicides". It is revealed that mostly (82.5%) farmers had significant impact on "batter farm planning" suggested by students for the improved crop production. "Motivate to adopt new technologies having positive impact" "create interest in organizing the fields visits (54.2%) rather than (45.2%) farmers were having average impact. Study showed that farmers were having the significant impact on "improves their communication skills with students and scientist".

Table 2: Percentage distribution of the respondents and impact on farmers of RAWEP (n = 120)

Sl. No.	Statements	Significant (3)	Average (2)	Minimal (1)
1	Improve fraternity among farmers	102 (85.0)	18 (15.0)	0.0 (0.00)
2	Gained knowledge of agricultural schemes	97 (80.8)	23 (19.2)	0.0 (0.00)
3	Introduce the utility of fertilizers, weeds and herbicides	99 (82.5)	21 (17.5)	0.0 (0.00)
4	Suggest the batter farm planning	99 (82.5)	21 (17.5)	0.0 (0.00)
5	Motivate to adopt new technologies	64 (53.8)	56 (46.7)	0.0 (0.00)
6	Create interest in organize the field visits	65 (54.2)	55 (45.2)	0.0 (0.00)
7	Improve communication skill of farmers	63 (52.5)	56 (46.7)	1 (0.8)
8	Introduce modern agricultural technique	71 (59.2)	45 (37.5)	4 (3.3)
9	Optimize the knowledge gap	62 (51.7)	55 (45.5)	3 (2.5)
10	Influence farmers decision making at village level	46 (38.3)	71 (59.2)	3 (2.5)
11	Share experience to encourage the farmers	7 (5.8)	68 (56.7)	45 (37.5)
12	Improve understanding of farming system	9 (7.5)	63 (52.5)	48 (40.0)
13	Inadequate extension services among farmers	15 (12.5)	56 (46.7)	49 (40.8)
14	Enhance education level among farmers	25 (20.8)	46 (38.3)	49 (49.8)
15	Remove confliction while expressing an idea	38 (31.7)	42 (35.0)	40 (33.3)

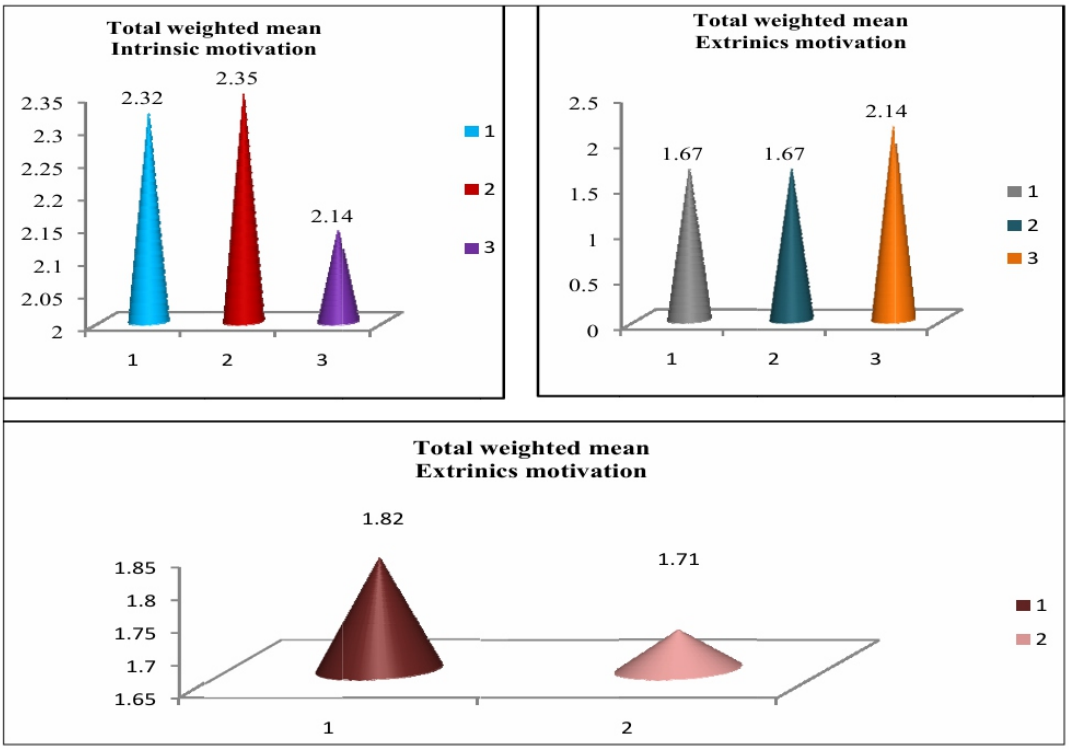

Fig. 1-3: Diagrammatic representation of intrinsic and extrinsic motivation

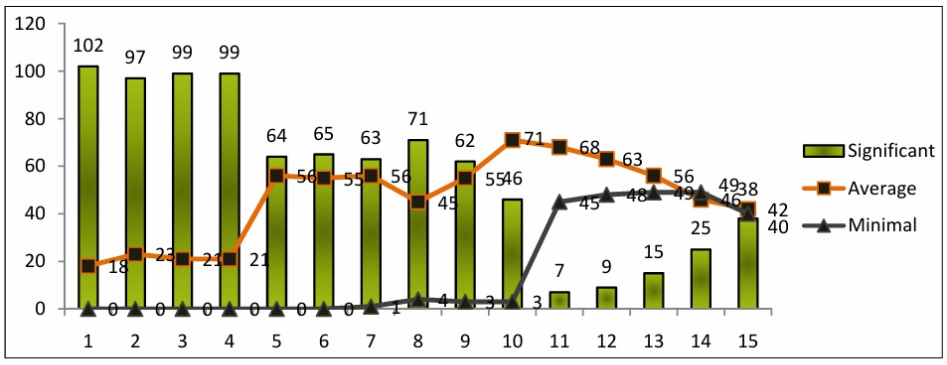

Fig. 4: Distribution of the respondents and impact on farmers as result of RAWEP

In this case farmers were having average impact on the communication skills (46.7%), "introduce about new modern agricultural technologies which is having positive impact (59.2%) while (37.5%) having average impact. According to similar finding (3.75%) students explained that through weekly outreach activities students got the opportunity to practices what they were taught in class in the real world of work (Lawala, 2014). The data presented in the table students and "farmer maintained the communication gap" (51.7%) as well as (45.5 %) having average impact regarding communication gap. "Influence farmers' decision making at village level" with high average impact (59.2%), share experience to encourage to the farmers (52.5%), "improves understanding of farmers system (52.5%) with average impact. "Inadequate extension services among farmers (46.7%) having average impact, "enhance education level among farmers (49.8%) with highest minimal impact (49.8%), "remove confliction while expressing an idea (35.0%) with average impact on farmers during investigation. The results from the study are parallel who reported that during village attachment during RAWEP students who were placed to different types of farmers expressed that they were acknowledged as fully professional. A similar situation was also reported by Ayarkwa et al. (2012) and Matamande et al. (2013) further elaborated that industrial attachment as an experiential learning similar to outreach programme, helped students to have appreciation of real world, to apply theory to practices from the hands-on training and students learnt about skills required as well as work ethics. As per study efforts are mainly concerned to encourage farmers to adopt new agricultural and efficient practices to change their situations for economic prosperity and livelihood security Jaiswal, et al. (2020).

CONCLUSION

It is concluded that during the investigation students were motivated due to having the interest in agriculture being selection of CCSAHU campus. Therefore university conducted this outreach programme effectively where students may learned the learning by doing and seeing by believing at village level. It is recorded during the study respondents explored their ideas among farmers community to change their philosophy and ways and means of life. It was found during the programme students maintained the communication and use their local dialogue/words to know their internal ideas and perception towards students. In case of extrinsic motivation of students regarded the norms of villagers which helped them to be the part of farmers associations. It is indicates the accepting the norms of rural people can be the way of establishing the harmony and motivate them for the adoption of new agricultural methods. However, the findings also clearly indicate that extrinsic motivations, particularly establishing communication and accepting the norms and others are important aspects. Therefore, students during RAWEP consider such facts that emboldening students and change the rural scenario.

It also concluded that majority of farmers were influenced due to such particular like improve fraternity among other farmers, gained knowledge of different schemes of rural development. Farmers were having significant impact on batter farm planning, farmers were having the positive impact on motivate to adopt new technology. It is confirmed in the study if the farmers have necessary support for improving these threats can aspect batter life in future.

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ETHICALAPPROVAL

This is research involving human subjects, and we do now declare that the research study has prior approval by a technical committee of scientists of CCS Haryana Agricultural University.

REFERENCES

Aruma, E.O. and Hanachor, M.E. 2017. Abraham Maslow's Hierarchy of Needs and Assessment of Needs in Community Development. Int. J. Dev. and Econ. Sustain., 5(7): 15-27.

Ayarkwa, J., Adinyira, E. and Osei-Asibey, D. 2012. Industrial training of Construction students perceptions of training organizations in Ghana. Education and Training, 54(2): 234-249.

Handage, S. and Chander, M. 2021. Development of an Instrument for Measuring the Student Learning Outcomes: A Content Validation Process, Indian J. Ext. Edu., 57(3): 1-7.

Jaiswal, M., Singh, A., Singh, K. and Singh, B. 2019. Training: An Effective Tool for Transfer of Agricultural Technologies. Indian J. Ext. Edu., 55(2): 1-5.

Kumar, A., Mehta, S.K. and Godara, A.K. 2020. Impact of Rural Agricultural Work Experience (RAWE) Programme on Profile of Host Farmers in Haryana. Indian Journal Pure & Applied Bioscience, 8(6): 152-156.

Lwala, F.F 2014. The Effectiveness of Outreach Programme as Experiential Learning for Training Students as Livestock Extension Workers in Tanzania, Sokoine University of Agriculture, Morogoro, Tanzania, pp. 40.

Mahadik, R.P., Mehta, P.G. and Sawant, P.A. 2011. Attitude of Students towards Rural Work Experience Programme. Rajasthan J. Ext. Edu., 9(3): 148-151.

Matamande, W., Nyikahadzoi, L., Taderera, E. and Mandimika, E. 2013. An investigation of the effectiveness of work related learning: A case of the industrial attachment program offered by the Faculty of Commerce, University of Zimbabwe. Instructional Pedagogies J., 12: 32-37.

Shivaramu, K., Naika, K.V. and Suresh, D.K. 2018. Perception of Students and Teachers on Achievement of Rural Agricultural Work Experience Programme Objectives, AJAEES, 24(2): 1-13.

Sreenath, P. and Sreedaya, G.S. 2021. Evaluation of Village Stay Module (VSM) of Rural Agricultural Work Experience Programme (RAWEP) of Kerala Agricultural University (KAU), India. Int. J. Soc. Sci., 11(01): 01-05.

Growth and Variability in Selected Cereal Crops in Madhya Pradesh

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ABSTRACT

The present study assessed the performance of selected cereal crops viz., wheat and rice in state in terms of growth and variability over 30 years' time period from 1991-92 to 2020-21. Further these periods are divided into four sub-periods. The study is entirely based on secondary data obtained from the Directorate of Economics and statistics, ministry of Agriculture, Government of India, New Delhi. To obtained this, exponential growth model and Cuddy-Della Valle index (CDVI) were used. The study concluded that, the area, production and productivity of wheat reported positive compound annual growth rate. However, a positive and significant growth rate were seen across the sub-period II and III. In terms of variability, it was found that in both the crops wheat and rice reported highest variation in production when compared to area and productivity.

Keywords: *Variability, compound growth rate, Cuddy-Della Valle index, rice, wheat*

Wheat and rice are the leading cereal crops in the world. Together, they supply more than 30% intake to human population (DES). In India rice cultivation is very popular in agriculture. It is core crop in India and millions of people love to eat it every day. "Rice is life" for more than half of the community. 2004 was designated as the 'International Year of rice' by the United Nations (FAO). Rice is fully loaded with protein, carbohydrates, vitamins like thiamine, niacin and minerals like zinc, phosphorus. India is the second-largest producer and exporter of rice in the world. Rice is grown almost in Madhya Pradesh, Tamil Nadu Chhattisgarh, Andhra Pradesh, Assam, etc., states in India.

Wheat is one of the most popular staple foods in India. It compares well with other cereal in nutritive value. It has good nutrition profile with 12.1 per cent protein, 1.8 per cent lipids, 1.8 per cent ash, 2.0 per cent educing sugar, 6.7 per cent pentose, 59.2 per cent starch with good source of mineral of vitamin and nicotinic acid (Agam et al. 2017). It is processed in different forms like flour, suzi, maida and being eaten by number of consumers in different ways as porridge (Halwa), chapati, bread and biscuits etc. Besides that, wheat straw and wheat bran are also good source of feed for animals (Sahu et al. 2020). India is the world's second largest producer of wheat. India's top wheat-producing states include Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan, Bihar and Gujarat. The second-largest wheat producer in India is Madhya Pradesh.

Since, wheat and rice are largely produced and consumed by large population there is necessity to increase production as it plays key role in enhancing income of the farmer. As wheat and rice being major crops in Madhya Pradesh, it is important to find out current status with relation to growth and variability. Examining growth and instability is important for improving the livelihood of the majority small-scale farmers who accounts for the majority of the food grains produced in the country. Instability in agricultural production raises risk in farm production, which in turn affects farmer's incomes and possibly their decisions for investment on new technology (Abu et al. 2017). Owing to the importance, the present research attempted to investigate growth and variability for wheat and rice in Madhya Pradesh.

METHODOLOGY

The study is merely based on secondary time series data obtained from directorate of economics and statistics department from the period of 1991 to 2021 i.e., 30 years for area, production, and productivity. Moreover, this study is categorised in four sub-periods i.e., Period I (1991-2000), Period II (2001-2010), Period III (2011-2020), Overall (1991-2020). Statistical tools like exponential growth model and Cuddy-Della Valle index (CDVI) were applied for the confined study. The study was bounded to selected cereal crops viz., wheat and rice.

Compound growth rate

The compound growth rate for wheat and rice in area, production and productivity was evaluated by using exponential growth model entire the study period. The growth model was fitted as follows (Balai et al. 2021):

The compound growth rate was obtained foe the logarithmic form of the equation as below:

$$Log\ Y = log\ a + t\ log\ b$$

Where,

Y = area/production/productivity

a = Intercept

b = regression coefficient / $(1 + r)$

t = Year

r = Compound growth rate / (Antilog b) – 1

The percent compound growth rate ® will be as,

$$R = [(Anti\ log\ of\ b) - 1] \times 100$$

Student 't' test was used for testing significance level of growth in area, production and productivity of selected rabi pulse crops (Balai et al. 2021).

$$t = \frac{CGR}{SE(CGR)}$$

Where,

't' = Student 't' test

CGR = Compound growth rate

$SE\ (CGR)$ = Standard error of Compound growth rate

$$SE(CGR) = \frac{100b}{l\,n10} \times SE(1nb)$$

Coefficient of variation

An index of instability was computed to examining the nature and degree of instability in area, production, and productivity of selected cereal crops. Simple coefficient of variation does not explain properly the trend component inherent in the time series data so the instability index was calculated busing better measure of variability suggested by Cuddy-Della Valle index (Cuddy and Della, 1978);

$$Instability\ Index = CV * \sqrt{(1 - R^2)}$$

$$C.V = \frac{\text{Standard Deviation}}{\text{Arithmetic Mean}} \times 100$$

$R^2 = ESS/TSS$ i.e., ratio of explained variation to total variation.

Where,

CV – Coefficient of Variation

R^2 – Coefficient of Determination

ESS – Variation explained by explanatory variable.

TSS – Total Variation.

The ranges of variability are given as follows (Balai *et al*. 2021):

Low instability – Between 0 to 15

Median instability – Greater than 15 and lower than 30

High instability - Greater than 30

RESULTS AND DISCUSSION

Growth performance in wheat and rice

The compound growth rate in area, production and productivity of wheat and rice was analysed from the period 1991-91 to 2020-21 and represented in Table 1. Wheat is one of the most important cereal crops of Madhya Pradesh. It was found that, the CAGR in area, production and productivity of wheat was increased at the rate of 3.75, 10.15 and 6.17 per cent per annum, respectively. At the same time, non-significant growth rate was found during overall period. During period I, the growth rates in area, production and productivity was accounted as 2.80, 6.17 and 3.28 per cent per annum, respectively. Similar results were observed as in overall period. During period II, the compound growth rate of wheat in area was increased by 3.51 per cent per annum with increase in growth of production and productivity by 7.15 and 3.51 per cent per annum, respectively. It was reported significant growth at 5% level of significance. In case of period III, similar findings were observed as in period II. Agam et al. (2019) reported similar findings in her study on growth performance of wheat in Amravati district during 1983-84 to 2012-13 and Sahu et al. (2020) also reported similar findings in her research work on growth in production of wheat in India during 2000-01 to 2017-18.

In Madhya Pradesh rice is cultivated in the area of 2117.00 thousand ha with the production of 4413.79 thousand toons and yield of 2085 kg/ha (Source; annual report; DES, 2021). From the table 1, it was reported that the CAGR in area and production were declined at the rate of -8.80 and -2.95 per cent per annum, respectively. Although maximum growth was found in productivity with the magnitude of 6.41 per cent per annum and it was recorded non-significant growth performance as in overall period. During period I, the growth performance of area, production and productivity was observed declined at the rate of -12.30, -19.65 and -8.38 per cent per annum, respectively. During period II, the CAGR in area of rice

was declined significantly for about -2.95 per cent per annum at 5 % level of significance. While, growth rates in production and productivity were observed positive and non-significant with the magnitude of 2.33 and 5.68 per cent per annum, respectively. In the mean time similar results were observed in period III showed the growth rates in area, production and productivity at the rate of 4.71, 11.69 and 6.66 per cent per annum, respectively.

Variability in wheat and rice

Instability analysis of area, production and productivity of wheat and rice during the study of 1991-91 to 202021 was presented in table 2 for overall basis and four periods wise. The variability was estimated by using Caddy- Della Valle Index. During the whole study period, highest variation in wheat was reported in production (17.80%) as compared to area (10.20%) and productivity (9.74%). During period I, the more variation in production (6.05%) followed by area of 1.68 per cent (lowest) and productivity (5.01%). Similar results were registered in period II and period III. During period II the highest variation was found in production (12.30%) as compared to productivity (6.97%) and area (6.20%). In case of period III, the variation in production was observed highest variation than area (6.22%) and productivity (3.39%).

In rice, variability analysis depicted that the area showed increased variability with 28.20 per cent andproduction was found to be high variability of 31.20 per cent while, productivity reported 13.10 per cent lowest variability in overall period. During period I, the more variation was observed in production (7.51%) followed by productivity (5.98%) and area of 2.74 per cent (lowest). During period II, variability in production and productivity were registered rose with 16.80 and 14.40 per cent, respectively. However, little variation was found in area at the rate of 3.82 per cent. During period III, lowest variation was reported 4.83 per cent in production whereas, the maximum variation was registered in productivity i.e., 6.40 per cent and variation in area was observed 5.66 per cent per annum.

Table 2: Variability in selected cereal crops in Madhya Pradesh (In Per Cent)

Crops	Particulars	Period I (1991-2000)	Period II (2001-2010)	Period III (2011-2020)	Overall (1991-2020)
Wheat	Area	1.68	6.20	6.22	10.2
	Production	6.05	12.3	7.85	17.8
	Productivity	5.01	6.97	3.39	9.74
Rice	Area	2.74	3.82	5.66	28.2
	Production	7.51	16.8	4.83	31.2
	Productivity	5.98	14.4	6.40	13.1

Source: *Author's computation.*

CONCLUSION

Analysing the entire study period, it can be confined that the area, production and productivity for wheat crop registered positive growth rate. However, in subperiod II and III the area, production and productivity under wheat crop registered positive and significant growth rates. The area, production and productivity for rice showed mixed pattern over the study period. For sub-period II and III area showed inverse and significant relationship. Although, rice crop showed non-significant growth rates it was important to increase the production by using high yielding varieties, improved advance technologies

for cultivation of crops.

In variability, greater extent of variation was registered in production as compared to area and productivity in both the crops i.e., wheat and rice.

REFERENCES

Abu, O. and Adakole, O. 2017. Growth and Instability in Selected Cereal Crops in Benue State, Nigeria and its Implications for Food Security. Asian Research Journal of Agriculture, 5(2): 1-8.

Agam, P.A., Chirde, P.N., Jare, S.B. and Thakare, S.S. 2019. Decomposition analysis of wheat in Amravati district. Journal of Pharmacognosy and Phytochemistry, 8(5): 1949-1952.

Agam, P.A., Tale, S.G. and Thakare, S.S. 2017. Economics of Wheat Production. International Research Journal of Agricultural Economics and Statistics, 8(1): 1-7.

Balai, H.K., Singh, H., Bairwa, K.C., Meena, G.L., Sharma, L. and Burark, S.S. 2021. Growth and Decomposition Analysis of Rabi Pulse Crops in Rajasthan. Economic Affairs, 66(3): 01-06.

Cuddy, J.D.A. and Della Valle, P.A. 1978. Measuring the instability of time series data. Oxford Bulletin Econ. Stat., 40: 79-85.

Dey, A. and Dinesh, R. 2020. Rice and wheat production in India: An overtime study on growth and instability. Journal of Pharmacognosy and Phytochemistry, 9(2): 158-61.

Directorate of Economics and Statistics, department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi, https://eands.dacnet.nic.in/APY_91 _to_20.htm Food and Agriculture Organization of the United Nation, 2022.

Kumari, N., Mehta, V.P. and Bhatia, J.K. 2020. Foodgrains Production in India: Trend and Decompositions Analysis. Economic Affairs, 65(3): 333-342.

Sahu, A., Nahatkar, S. and Kolar, P. 2020. Variability and growth in production of wheat in India. Economic Affairs, 65(2): 255260.

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