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A Comparative Study of Sugarcane Harvesting and Its Impact on Health Conditions of Labor from Thailand and India

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Abstract: This comparative research paper examines the difference between sugarcane harvesting practices in Thailand and India. The objective of research was to investigate and compare current pattern of sugar harvesting and its impact of these approaches on labor health conditions in the sugarcane industry of both the countries as India and Thailand. Data were collected from target population groups (40 each) from study areas, namely Kanchanaburi and Saraburi provinces in Thailand and Beed District of Maharashtra state from India. The data showed that comparatively in Thailand, adoption of mechanized harvesting was seen more. However in India, mechanized harvesting was seen increasing but still people were largely involved in sugarcane harvesting and it had ill effects on the overall health of female workers specially. The result clearly indicated that there was drastic difference in harvesting system and labor health conditions in Thailand and India. The findings underscore the multifaceted impact of their occupation on various aspects of health including general well-being of female sugarcane cutters. The strenuous nature of sugarcane cutting, coupled with inadequate protective measures and limited access to healthcare has contributed to a range of health care challenges among female sugarcane cutters in India.

Keywords: sugarcane harvesting; mechanization; manual sugarcane harvesting; labor health condition

Introduction

Sugar is an important food product globally. According to Statista, a commercial data provider in 2019, global sugar production reached a level of more than 178 million tons, which grew about 4.7% compared to 2017. In terms of production quantities, India was the largest contributor with a share of 18.7% of global sugar production, followed by Brazil (16.5%), the European Union (9.8%), Thailand (8.7%) and China (6.0%). (Rojrak, Manutchai, Komsan, & Wacharapong, 2017).

Sugarcane plays a vital role in the Thai economy, the country is the world's third-largest sugar exporter (Workman, 2019). Sugarcane is not only a feedstock for food, it is also a source of bio-energy such as bio-gas-based electricity and molasses-based ethanol (Gheewala et al., 2019). Every year, Thailand produces a large amount of sugarcane to serve the sugar industry. In 2021, the nation grew more than 66 million tonnes of sugarcane (OCSB, 2021).

Sugarcane is a major input for sugar production in Thailand. Thai government therefore attempts to promote sugar industry consistently. Recently, Thai government has launched the program to expand existing facilities and to approve 12 additional new sugar mills under the10- year Cane and Sugar Strategy (2015-2026). At present, the country has faced increase in production cost, especially in the harvesting process due to the problem of labor shortage and the increase in minimum labor wage.

Production area of the crop in the country is around 1.6 million ha annually, producing about 104 million tons of sugarcane and about 11million tons of sugar (Office of Agricultural Economics, 2016). Despite the vast production area, the crop was still harvested almost entirely by hand, which demand lot of labor. Out-migration to rapidly growing industry and service sectors resulted in a continuous decline of agricultural labors (NSO, 2016). As a consequence, labors for sugarcane

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harvesting become more and more scared. This has resulted in the untimely harvesting of the crop which affected sugarcane yield and quality and also the regularity of the cane supply to the sugar mill. Combine harvesters had been introduced and used by some large farmers to solve this problem. Sugar mills have also started to provide combine harvesters to help farmers in their service areas.

Harvesting is an important activity in the sugar production industry. Due to the labor shortage and time limitation during harvesting season, farmers adopted cane harvesters to substitute the farm workers in this restless period. Cane harvesters were found to be huge and expensive machines with high field capacity. Because of inappropriate working conditions in Thailand, the actual field capacity was noted to be much lower than that in its specification (Kaewkabthong and Udompetaikul, 2019).

The office of sugar and cane board (OSCB) reported that the average cost of sugarcane harvesting in Thailand accounts for 53% of the total labor cost or equivalent to 21.12% of the total cost at farm (OSCB, 2016). The average cost for sugarcane transportation was 2.79 US$/ton, or 106 baht/ton in 2003 (OAE, 2003). This results in farmers investigating labor saving technologies such as on-farm mechanization of sugarcane harvesting.

There are two modes of sugarcane harvesting in Thailand: manual harvesting and mechanical harvesting. Farmers invest in sugarcane harvesters to avoid a situation flab over shortage in moderate and large farms. They often used the machine in farm and rent out to other nearby farmers. This implies that small farmers or farmers who cannot invest in agricultural machineries access farm machinery through rental services or a custom hiring system, which almost found in middle income countries (Biggs and Justice 2015).

Thai government has promoted "green harvesting", which require no sugarcane burning before harvesting by means of mechanized sugarcane harvesting (Thansettakij Multimedia, 2019). However, to date there are still some issues associated with using harvesting machines for the Thai sugarcane farmers including the high cost of machines and the required conditions of sugarcane fields to use the harvesting machines(Wirawat et al.,2018). In many sugarcane plantations in Thailand, green sugarcane harvesting found to depend on manual labor.

The harvesting season for sugarcane usually begins in November and ends the following May. At the beginning of each harvesting season, the Royal Thai government sets the price of two types of sugarcane, namely fresh and fired, based on sweetness (sugar content) and gross weight of sugarcane delivered to the sugar factories (Pornprakun, 2019)

The wages for all stages of sugarcane cultivation were not different between the green and burnt harvesting. It was reported that in sugarcane harvesting, the workers were paid wages based on the amount of sugarcane they cut. Fifty nine percent of workers in the green sugarcane harvesting reported that they were paid at least minimum daily wages (Minimum wages 9 USD/day) based on local general wage. Seventy-six percent of workers in the burnt sugarcane harvesting reported that they received at least the minimum wage. Green sugarcane harvesting required expertise and strength. The green sugarcane farms had dense sugarcane leaves and grass. Workers have to peel off the sugarcane leaves before cutting, resulting in extra and longer working hours. In addition, in Thailand, the hot weather slow down the work. Sawaengsak et al.(2021) reported that workers who were more skilled and healthy could cut sugarcane in large quantities, resulting in wages greater than or equal to the minimum wage.

The commercialization of sugarcane production systems lead to adoption of mechanization as labour saving technologies. Pingali (2017) suggested two phases of switching from labour to harvesting machines in the harvesting process. The first phase, farmers adopt the machine even under low hired wage condition because of a peak season labor scarcity problems. In the second phase, farmer switch to the harvesting machine due to rising in real agricultural wages and a labor shortage problem.

India

The traditional method of sugarcane harvesting in India relies heavily on manual labor. Skilled workers, known as sugarcane cutters, manually harvest mature sugarcane stalks using hand tools like machetes or sickles. The labor-intensive process involve bending, cutting and loading heavy

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stalks onto carts for transportation. The reliance on manual labor makes the process physically demanding, time-consuming and economically unsustainable in the long run.

The process of manual cane cutting is an activity that imposes a high physical load on the cutter, since it require the performance of vigorous, fast and repetitive movements with a machete, in addition to loading of the sugarcane bundles. The manual cutting of cane include several cane stalks cutting near the ground and their gathering in bundles that weigh about 10 to 15 kg. They had to load bundles for about two to five meters and arrange in rows to be picked up by the trucks that transport them to the mill for grinding. Payment per production was also observed to be an additional risk factor, as it induces a longer rate of work to guarantee a slightly better wage and a greater possibility of hiring in subsequent harvester.

The impact of manual sugarcane cutting on labor health had a significant concern in the sugarcane industry. The physically demanding nature of the work, coupled with long hours in challenging field conditions, had detrimental effects on the health and well-being of sugarcane cutters (Singh et al 2012).

Maharashtra was rated second among all Indian states in sugar cultivations, after Uttar Pradesh. The sugar industry relies on informal migrant labour from the drought prone Marathwada region for cane cutting. The social and economic challenges in sugarcane cultivation include water scarcity; poverty, indebtedness and gender inequality among women migrant workers in addition to child rights violations (Oxfam 2020).

Asawa & Singh (2016) reported that Beed as the district which supplying maximum number of migrants followed by Ahmednagar, Jalgaon, Aurangabad and Nashik. Most preferred destinations were Ahmednagar followed by Pune, Nashik, Kolhapur. Migrants belonging to the vanjari caste were the largest group of migrants followed by the maratha, banjara, bhill and dhangar. The age of female migrant was lower than that of male migrants. Education level was very poor and almost half of the migrants were non literate. Among literate migrants, maximum migrants had completed just fifth standard of schooling.

The sugar industry is the second largest agro based industry in India and this sugar industry relies on migrant workers. These workers were found seasonal migrants who migrate mainly from the drought prone areas of Marathwada region, Maharashtra for cane cutting. Almost all of the women migrant sugarcane workers are women migrate with their children. It was seen that about 2,00,000 children above 14 yrs age help their parents to cut cane during harvesting season (Shukla, et al.2017).

Manual sugarcane cutting involved physically energy demanding tasks leading to increased risks of musculoskeletal disorders, heat-related illnesses and exposure to agrochemicals. Workers engaged in manual cutting were susceptible to strain, fatigue and potential long-term health issues due to the repetitive, ardous and strenuous nature of the work.

While mechanized sugarcane harvesting reduced the physical strain on laborers to a considerable level but presented its own set of challenges in country like India, where a large labour force is involved in this activity. Workers involved in the operation and maintenance of machinery faced occupational hazards, such as mechanical accidents and exposure to moving parts of harvesters. Therefore the research was conducted to investigate and compare current pattern of sugar harvesting and its impact on labor health conditions in the sugarcane industry of both the countries as India and Thailand.

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Manual harvesting in India

Mechanized harvesting in Thailand

Materials and Methods

The data were collected from target population of Kanchanaburi and Saraburi provinces, largest western provinces of Bangkok, Thailand with the help of pre structured interview schedule indicating existing situations and sugarcane harvesting modes in Thailand and India (sample 40 each). India, study was conducted by taking in-depth interviews of 40 women sugarcane cutters from two talukas namely Parali and Georai from Beed district of Marathwada region, Maharashtra state with the help of structural interview schedule, through informal talk with Mukadum's (team leaders) and observations during the sugarcane harvesting season (October to March). Z test was applied to compare the percentages of the various responses to the different parameters with regard to the general health issues faced by female sugarcane cutters.

Female sugarcane cutters in field while cutting sugarcane stalk and uploading on truck in Indian scenario

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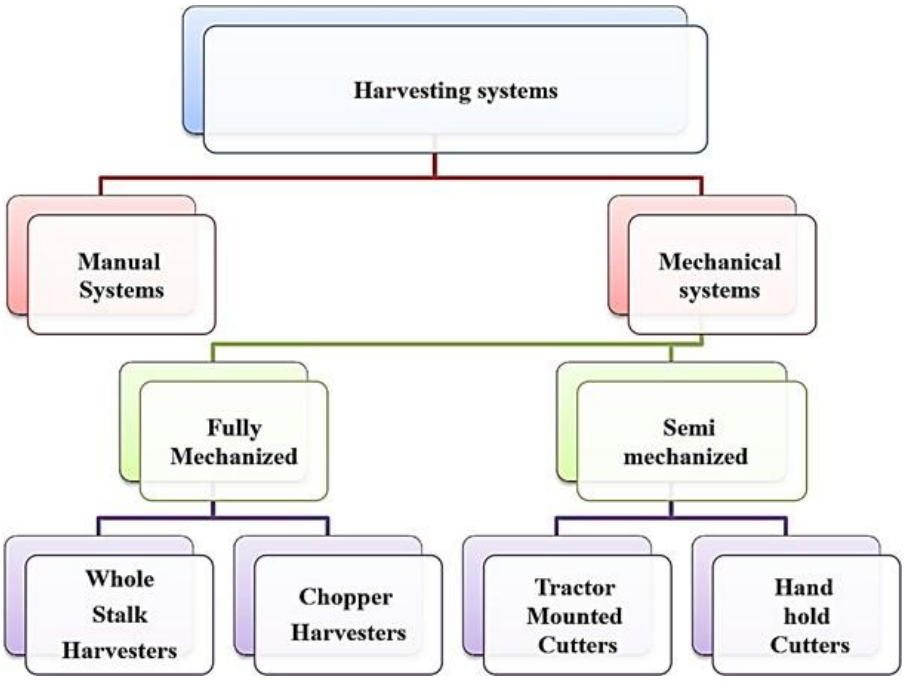

(Braithwaite, 2013; Tweddle, 2013; Yinggang et al., 2013).

Sugarcane harvesting system in Thailand

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Manual harvesting of green and burnt sugarcane (Chatterton and Braith, 1985).

Sugarcane cutters while doing manual cutting and carrying sugarcane stalks

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Collection of data from a Thai female sugarcane cutter

Attire of male and female sugarcane cutters with protective

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Site Map of Study Area in Thailand

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Site Map of Study Area in India

Results and Discussion

The living style and problems of female sugarcane cutters during sugarcane cutting season is dealt in Table 2. It is very important to note the living conditions of female sugarcane cutters during sugarcane cutting season on fields. Obviously it was reported by almost all of them that they had to get up early in the morning (by 4-5 am) to reach to the fields in time (by 7-8 am) by doing all household jobs and cooking for the whole family. It was reported that they do not have any fixed meal time and depending on their work on the field or based on the loading and unloading of sugarcane on truck, they need to adjust their breakfast or lunch. They need to lift heavy bundles of sugarcane stalks from the cutting area to the vehicle. They do not have safe drinking water facility

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either on farm or in their households and even no electricity where they live in the huts and do sugarcane cutting in fields for late night till 9-10 pm in some instances.

As they are being counted as one koytas along with their husband and therefore they could not take off even for health issues. If they fell sick most of the times, they need to do work during this period also. The primary health care center or hospitals in rural area were not found approachable and they need to continue the work during illness.

The cane cutting season is observed mostly during October-April every year. They expressed that during this period, the extreme weather conditions of cold & heat resulted into many health problems.

During this seasonal period, on field they face extreme heat during day time while extreme cold conditions of mid night. In addition to this, many times being this is a seasonal, time bound and contractual work, many mid night emergencies occur as and when the vehicle reaches to collect sugarcane, it needs to be loaded at the same time, midnight even. Many of the times they have to work even late night too. On fields, mostly the electricity or electric poles were found to be not available and therefore for these women specially for the young children had to sleep in dark for the whole night in unsafe environment.

The other major issue reported by the female sugarcane cutters was non availability of washrooms at field which lead to many problems of privacy to manage themselves specially during menstrual periods. Therefore the female sugarcane cutters were found it to be very difficult to change the sanitary pads or cloth used by them for menstrual management. Even they could not wash the personal parts during this period due to unavailability of water on field. This again lead to unhygienic conditions and increased reproductive health issues.

These issues and life style problems were faced by all these female sugarcane cutters one or the other time or in their routine and had agonizing ordeal experiences.

These results are in line with the study conducted by Shinde (2023) explaining various health issues of sugarcane cutters.

The bitter story of the sweet sugar cane revealed number of the problems such as housing, water, education, food, electricity and drainage and many more that too in very painful and dreadful health conditions of these women (Mane & Tadakhe 2013).

It can be said that the everyday lives of female sugarcane cutters were found to be embedded in a circumstances of poor living conditions, prolonged working hours and minimal access to public health services.

Table 1. Living style and problems of female sugarcane cutters from India.

Living style and problems	Percentages of female sugarcane cutters (n=40)
Getting up early in morning	100 (40)
No fixed meal time	100 (40)
Heavy load lifting	100 (40)
No safe drinking water facility	100 (40)
Late night working hours	100 (40)
Midnight work emergency	100 (40)
Compulsion to work during illness	100 (40)
No treatment for illness	100 (40)
Unsafe fields	100 (40)
No electricity	100 (40)
Extreme weather conditions	100 (40)
No wash rooms at field	100 (40)
No hygienic conditions	100 (40)
No knowledge of government schemes	100 (40)

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Table 2. Comparative study of general health problems encountered by female sugarcane cutters.

General health problems	Percentages of female sugarcane cutters		Z value
	Thailand (n=40)	India (n=40)	
Back pain	75.00 (30)	95.00 (38)	2.3**
Headache	70.00 (28)	98.00 (39)	3.7**
Breathlessness Urinary	62.50 (25)	100 (40)	4.95**
tract infection	62.50 (25)	100 (40)	4.95**
Blurring of vision	50.00 (20)	95.00 (38)	5.22**
General weakness	50.00 (20)	93.00 (37)	4.84**
Sun stroke	50.00 (20)	75.00 (15)	2.39**
Chest pain	47.50 (19)	85.00 (34)	3.92**
Body aches	45.00 (18)	85.00 (34)	4.13**
Blood pressure	42.50 (17)	95.00 (38)	6.21**
Abdominal pain	37.50 (15)	85.00 (34)	5.06**
Skin problems	35.00 (14)	95.00 (38)	7.24**
Frequent urination	25.00 (10)	93.00 (37)	8.56**
Cramps in legs	25.00 (10)	88.00 (35)	7.36**
Diabetes	20.00 (8)	25.00 (10)	0.54^{NS}

Figures in parenthesis indicate frequency *P<0.05 level **P<0.01 level NS –Non -Significant.

Table 1 and Figure 1 study the general health problems encountered by female sugarcane cutters (40 each) from Thailand and India. The female sugarcane cutters from Thailand reported that mostly they faced general health problems like back pain (75%), headache (70%), breathlessness while working and frequent urination (62.5% each). Fifty percent of them reported to be having blurring of vision, general weakness and sunstroke, while more than 40% of them expressed that they were having chest pain, body ache, urinary tract infection (25% each). The chronic health issues like blood pressure (42%) & diabetes (20%) were also found among them.

Meanwhile a very high percentage of female sugarcane cutters from India reported various general health problems. Almost all of them reported about the abdominal pain and blurring of vision (100% each), followed by headache (98%), breathlessness, frequent urination, body ache (95% each), general weakness, chest pain (93% each), problems of sunstroke during summer season (88%) and lastly cramps in leg, skin problems, urinary tract infection (85% each). One fourth of the selected sample expressed that they face problem of diabetes.

The study of Leite (2018) indicated many health issues such as respiratory, cardiovascular, renal, musculoskeletal, heat stress, dehydration and accidents among the female sugarcane cutters and found in similar line with these results.

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The findings underscore the multifaceted impact of their occupation on various aspects of health including general well-being. The strenuous nature of sugarcane cutting, coupled with inadequate protective measures and limited access to healthcare has contributed to a range of health care challenges among female sugarcane cutters in India.

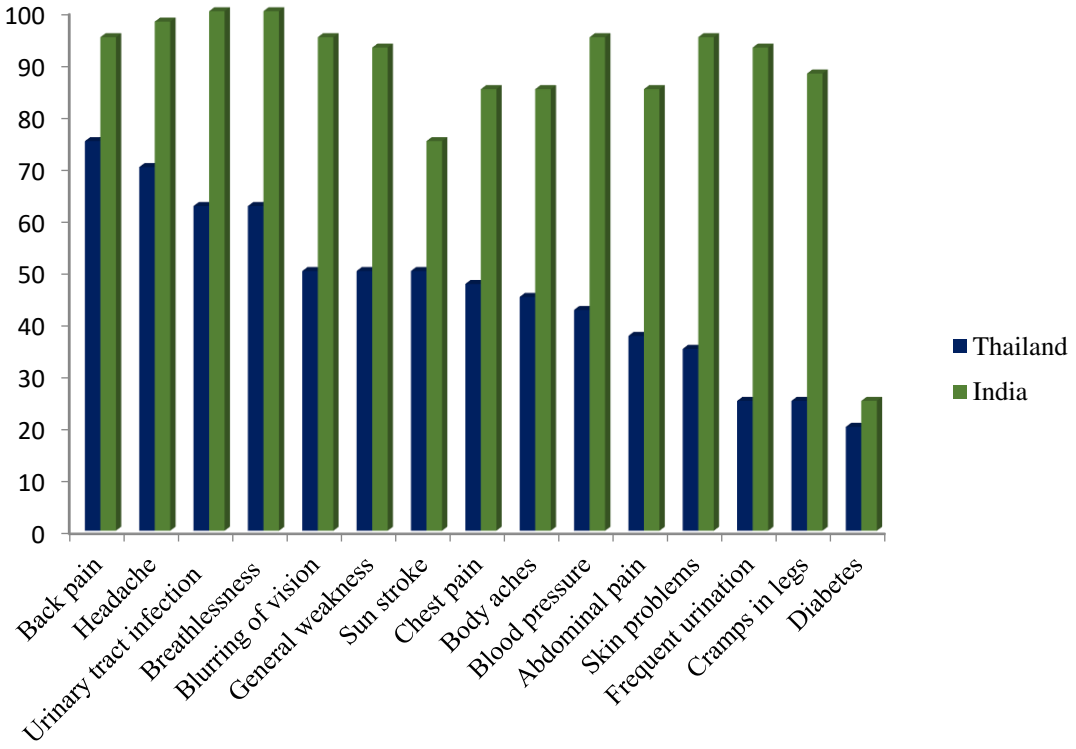

Figure 1. General health problems of female sugarcane cutters from Thailand and India.

Conclusion

The comparative analysis of mechanized and manual sugarcane harvesting practices in Thailand and India has shed light on female labor health conditions. The findings provide insights into the problems associated with mechanized and manual sugarcane harvesting practices, highlighting the importance of prioritizing the well-being of female sugarcane workers in India. The study has revealed that Thailand has made strides in mechanizing its sugarcane harvesting processes, thereby potentially reducing the physical burden on female labor. On the other hand, in India, where mechanization is less prevalent, women were found disproportionately affected by the physically demanding nature of manual harvesting, challenges persisting in terms of workplace safety. It can be said that the everyday lives of female sugarcane cutters were found to be embedded in a circumstances of poor living conditions, prolonged working hours and minimal access to public health services. The findings underscore the multifaceted impact of their occupation on various aspects of health including general well-being. The strenuous nature of sugarcane cutting, coupled with inadequate protective measures and limited access to healthcare has contributed to a range of health care challenges among female sugarcane cutters in India.

Addressing the health issues of female sugarcane cutters requires a comprehensive and collaborative approach, immediate attention to improving working conditions, ensuring access to proper protective measures and implementing health and safety training programs.

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