



# LESSONS FROM MILLETS, NUTRITION AND BEYOND:

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Peek into Bakeries of Bhubaneswar - Cuttack,  
The National Family Health Survey (NFHS) Data and More

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## **CONTENTS**

|                                      |      |
|--------------------------------------|------|
| Abstract .....                       | - 1  |
| Introduction .....                   | - 1  |
| Data and Survey .....                | - 2  |
| Variety of Healthy Products .....    | - 3  |
| Customer-base .....                  | - 3  |
| Discussion .....                     | - 4  |
| Sources .....                        | - 4  |
| Number of Orders .....               | - 4  |
| Summary of Millets in Bakeries ..... | - 7  |
| Scope for Further Study .....        | - 8  |
| Other Areas of Work .....            | - 8  |
| Conclusion .....                     | - 12 |
| References .....                     | - 13 |

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## ABSTRACT

Milletts have historically played an essential role in the Indian agrarian system. This is primarily because of its high nutritional value, accompanied by marginal growing conditions. Analysing the trends in products sold by six bakeries across Bhubaneswar and Cuttack, this study attempts to understand the patterns in customer behaviour towards healthy items, with emphasis on millet-based bakery goods. With active support from the government to promote the production and consumption of millets over the past few years, urban households have gradually introduced millets into their diet in both traditional and innovative forms.

The introduction of millets in the bakery industry further strengthens the popularity of these gluten-free cereal crops as a dietary option. It contributes to the argument that millets show great versatility in preparing diverse dishes. This study shows that while millets continue to be a popular choice of ingredient for urban citizens who suffer from health issues, the popularity of millets is still in the regular diet plan of people. Using India's National Family Health Survey data, this study also investigates the proportion of people across Odisha suffering from various ailments. It makes arguments about the expected trends in demands for millet-based bakery goods. Finally, with the popularity of millets gradually increasing in the biscuit-industry, the active promotion of millets in the bakery industry may eventually lead to millets capturing a sizable proportion of the broader bakery sector.

## INTRODUCTION

Milletts constitute a group of cereal crops that was an integral part of the agricultural system in the Indian past. It was with the onset of the Green Revolution in the 1970s (P. Singh, 2017) that high-yielding variants of wheat and rice replaced millets in our food system, as the cultivation of millets gradually became uneconomical to the farmers. Alongside, a lack of knowledge about the nutritional benefits of millets along with the general association of millets with poverty further lowered the popularity of millets. This led to higher consumption of refined and high-yielding variants of wheat and rice, particularly in urban areas. Combined with unhealthy lifestyle choices arising from increased work pressure, this led to a significant rise in obesity, diabetes and heart-illnesses across age- groups. Rich in potassium, magnesium and fibre, millets have slowly become a standard dietary solution in several households to tackle health and weight issues. The Government of India had approved 2018 as the National Year of Milletts

to boost millet production and consumption due to hunger, climate change and other health issues (Praveen & Nagaraja, 2021).

While millets are slowly being adopted to tackle major health issues, they have still failed to dominate the food choices of urban homes, owing to their unsavoury taste. Thus, to increase the palatability of millets, several recipes have been introduced into the Indian households which successfully incorporate millets into regular breakfast dishes. Consumption of millets in the form of *upma*, *chapati*, *dosa*, *idlis* and other items is slowly gaining popularity as it fulfils the demands for a healthy lifestyle (Jeshi, 2016). As millets aid in controlling blood sugar, cholesterol, and weight gain, their consumption as a substitute for rice or wheat products has witnessed an increasing trend in Indian households. Millets, being gluten-free, is also suitable for people across the country who suffer from celiac disease, which is a condition where gluten consumption may cause damage to the small intestine. With celiac disease affecting nearly six to eight million people in India, according to All India Institute of Medical Sciences, the role of millets in the Indian diet becomes an increasingly relevant discussion.

Millets are also making their way into the bakery sector of India. With India being the second-largest producer of biscuits after the USA, the biscuit and cookie industry provides many opportunities for growth and innovation in millet-based recipes (IMARC, 2018). Finger millet or *ragi* cookies are an exemplary innovation in the Indian bakery sector in response to the growing demand of the urban population's need for healthier alternatives in all food consumption levels. The use of millet flour in baking cakes, bread, cookies and muffins is also gaining more attention as millets are naturally gluten-free. Some popular forms of millet used in the manufacture of bakery products are Pearl millet (*bajra*), Foxtail millet (*kangni*), Proso millet (*barri*), and Finger millet (*ragi*).

This study involves a survey of a total of six bakeries in Bhubaneswar and Cuttack in Odisha in order to analyse the trends in demand for healthier products. This report, additionally includes the impact of the lockdown following the recent pandemic on the market for healthy food products and the overall performance of the businesses. This study will help us understand the demands of the consumer-base in Odisha and help us recognise appropriate distribution policies of millets for the urban population of Odisha.

## DATA AND SURVEY

For this study, six bakeries were interviewed across Bhubaneswar and Cuttack. All six bakeries are owned by home bakers and mainly operate their business over social media. All of the bakeries have been operational during the COVID-19 pandemic and generate their revenues through home-deliveries. As these businesses operate online, their customers are primarily from an urban class.

Table 1: Data of Bakeries

BAKERIES	AGE OF OWNER (in years)	CITY	TIME OF OPERATION
A	18	Bhubaneswar	1 year
B	24	Bhubaneswar	5 months
C	49	Cuttack	11 months
D	25	Bhubaneswar	9 months
E	25	Bhubaneswar	11 months
F	20	Cuttack	8 months

All the bakeries have been operational for less than or equal to a year. Since all six bakeries function online from their homes, they also deal with demands for various customisations of ingredients, decorations, and so on. As the distance from the home is no barrier for the customer to order from these bakeries, these bakeries have a customer-base across the city and are not confined to a particular locality. These bakeries are owned mainly by young entrepreneurs who rely on social media platforms to spread awareness about their business. The survey was primarily focussed on the variety and demand for healthy products in their catalogues.

## VARIETY OF HEALTHY PRODUCTS

All the bakeries were surveyed on the variety of products sold by them. The range of their baked products included cakes, brownies, muffins and cookies. Bakery A revealed that they use oats, ragi and jowar for their healthier range of products. Similarly, Bakeries B, C, and E also use brown sugar, whole wheat, dates and other ingredients for the more nutritious products. Bakeries D and F do not have a range of healthier alternatives to regular baked goods.

Table 2: Data on Products

BAKERIES	HEALTHY INGREDIENTS	SOURCE
A	Oats, ragi, jowar	Local grocery store
B	Whole wheat, brown sugar, oats	Supermarkets
C	Ragi	Supermarkets
D	None	-
E	Whole wheat, jaggery, dates	Local grocery stores
F	None	-

## CUSTOMER-BASE

To understand the section of the customer-base that demanded healthy alternatives, bakeries A, B, C and E were further questioned about the details of customers who preferred healthier food items. Bakery A mentioned that the customers who placed orders for healthy products were essentially over the age of 60 years or between 20 to 25 years. It was noted that the age group of 20-25 years primarily ordered based on their concerns about weight and fitness while the age group of over 60 years preferred healthier products

Table 3: Data on Customers

BAKERIES	AGE GROUP	REASON	NUMBER OF ORDERS PER WEEK
A	60+ and 20-25 years	Diabetes or other illness, concerned about weight	1 out of 40
B	50-60 years	Concerned about weight	2 out of 30
C	30-50 years	Diabetes or other illness	1-2 out of 25
D	-	-	-
E	30-50 years	Diabetes or other illness	N/A
F	-	-	-

in response to diabetes or other illnesses. Bakery B mentioned that most of their customer base includes students and faculty from medical colleges across Bhubaneswar. The other bakeries informed that their customers were spread uniformly across the city from which they operate.

Using data from India's National Family Health Survey, the paper also analyses the population distribution of those who are either diabetic or have any heart illness, to understand the expected trends in demand for healthier bakery products. NFHS (2015-16) data was used for the purpose of this study in addition to the survey conducted independently.

## DISCUSSION

The ability to place orders for food online provides endless scope in innovation and choices. While food businesses benefit from exposure gained from countless people visiting their websites, the customers also find numerous food outlets that are better suited to their tastes and demands. From Table 1, we can observe that most of these online bakery businesses are owned by young entrepreneurs who have used the access to widespread users of the Internet to establish and promote their businesses. This seems to have worked to their benefit especially as the COVID-19 pandemic has affected the food industry across the country.

## SOURCES

While some of these bakeries order products such as chocolate in bulk from e-commerce websites, Table 2 reveals that all the above bakery's source ragi, oats and other healthy ingredients from local grocery stores and supermarkets. This indicates that these bakeries choose not to buy these products in bulk amounts from the wholesalers, which increases their profit. The primary reason for this is the lack of demand from customers. All the bakeries revealed a lack of demand for healthy products compared to traditional bakery products. We can see from Table 3 that they receive only 1 or 2 orders for healthy bakery goods each week. Hence, it is profitable for them to buy from local stores rather than order in bulk amounts and store them. These bakeries showed a willingness to switch to ordering in bulk from wholesalers if their customers ever showed an increase in demand for this range of products. Most of these bakeries admitted that they had not contacted or reached out to any wholesalers who sold millets. Bakeries were also interested in testing millets other than ragi in their products if there was a demand for them and if the millets were readily available to these bakeries. While some bakeries said that they were unaware of the different products that could be baked with millets, they were eager to test new recipes if the customers showed interest in millet-based products.

## NUMBER OF ORDERS

Table 3 clearly implies lower demand for goods made from healthy ingredients. Bakery A suggests that this could be because regular bakery goods are more marketable than bakery goods with healthy ingredients. Due to the lack of active advertisement of a healthy range of products, the customers might not be aware of the diverse possibilities and customisations that



can be introduced with the help of healthy ingredients. Bakery B, on the other hand, explained that this could be due to a lack of awareness on the nutritional benefits, particularly when it comes to millets. It can also be seen that the customers who order bakery products mostly have diabetic conditions or are suffering from other illnesses (*Table 2*). Hence, they might be reluctant to try bakery goods because even a healthy variant of these goods might not be suitable for their dietary requirements. Taking these nutritional restrictions into account, bakery goods might be an occasional indulgence for this category of customers. Thus, these people are more likely to consume millets through regular home-cooked food items than through bakery items.

Based on NFHS-4 data, *Table 4* demonstrates the distribution of population who are currently diabetic, have heart diseases or are overweight across Odisha. We can see that less than 5% of men and women have diabetes or heart ailments. A higher proportion of men seem to suffer from health issues as compared to women. In comparison between the population distributions, we observe that a lower proportion of rural households show these diseases as compared to urban households.

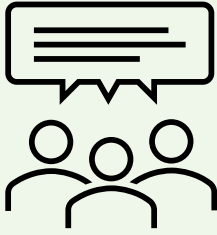
*Table 4: Data on Health Conditions*

VARIABLE	CATEGORY	URBAN	RURAL	RURAL
Currently has diabetes	Men	4.63	2.56	3.04
Currently has diabetes	Women	2.91	1.23	1.56
Currently has heart disease	Men	0.48	1.61	1.36
Currently has heart disease	Women	1.16	1.01	1.04
Overweight	Men	32.23	13.35	17.05
Overweight	Women	32.06	13.34	16.56

This shows the disparity in lifestyle choices of the urban and rural households and its impact on the health of people across these households.

From the table above, we can attempt to understand the trends in the number of orders received by the bakeries. As the overall percentage of people with diabetes or heart diseases is less than 5%, fewer people are bound by dietary restrictions for their health. Thus, the number of orders for healthier food options is likely to be much lower than the number of regular orders. This appears to be consistent with the data received through the survey. However, a much larger number of people suffer from higher BMI than diabetes or heart ailments. This category of people also needs to be encouraged to introduce millets into their diet to lead a healthier lifestyle.





*Customers interested in trying healthy variants of bakery items belong to primarily two categories: people who are trying to be fit and people bound by dietary restrictions due to some illness. Our survey found that most customers who search for healthy products from these bakeries have diabetes, heart ailments, or other diseases. When it comes to millets, customers might associate millets with traditional Indian food and prefer to consume it in cereal rather than bakery goods, such as cakes, which are usually considered luxury foods. Unless health restrictions bind the customers, they will prefer to eat regular cakes better suited to their tastes... While the demand for millet-based bakery items is low, the market for millets other than ragi in bakery items is even lower. This seems to be consistent with the fact that while demand for healthier snacks has resulted in significant biscuit brands introducing their range of ragi and oat cookies, other millets are yet to become prominent in the biscuit industry.*

A significant factor contributing to this, as mentioned earlier, is the lack of awareness and information on the nutritional benefits of millets. While customers might be fixated on the taste of the unsavoury millets, they might not emphasize the several health benefits that millets have. Millets, being extremely versatile, can be used to prepare several palatable dishes. However, most of the bakeries admitted that they had not tried different recipes using millets. Thus, this is a case of lack of demand by the customers and lack of supply by the bakeries, leading to market failure, where a sufficient number of healthy bakery products are not present in the market.

All the bakeries that sell healthy bakery items reported that most customers who purchase these items are returning customers. This implies that after ordering ragi, oats or whole wheat-based bakery items; they are willing to repurchase them. This is a positive indicator implying that customers who have tasted these products have found them palatable, as opposed to the notion that millets might be unsavoury. Thus, consumption of millets in the form of bakery goods might be appealing to a larger group of people when compared to consumption of millets in the form of regular cereal. Several bakeries also are of the opinion that many customers found other local outlets not to be inclusive of various ingredients, which then implies that while there might be a market for millet-based bakery products, the local bakery stores might have failed to accommodate these demands.

The bakeries also reported the changes their businesses faced during lockdowns owing to the COVID-19 pandemic. Most bakeries experienced a dip in the number of orders every time the Government announced a lockdown. This could be due to the fear of spreading of the diseases and the customers not trusting delivery services to be completely safe. However, the bakeries usually saw an increase in the number of orders after approximately one week of the lockdown, which could imply the demand of customers for outside food overpowering their fear of contracting COVID-19 over time. Most bakeries said that lockdown has boosted their business and increased the number of orders that they receive. With limited access to outdoor cafes and

local bakeries during lockdowns, the customers seem to be more interested in switching to ordering food online than visiting outlets. However, the bakeries have not seen many changes in demand for millet-based or other healthy variants of baked goods during the lockdowns. Lack of awareness even at a time when 'health' was the most prominent concern on a global level, about the health benefits of millets, could be the primary cause for this.

We can see that, in general, people do not associate millets with luxury food items such as bakery products. Most customers appear to associate millets primarily with home-cooked Indian dishes. Thus, more awareness and discussion about the health benefits of millets could perhaps persuade more people to switch to healthier choices of bakery goods.

According to a large-scale survey conducted by Smart Food Initiative to examine millet consumption behaviour in urban India (Kane-Potaka et al., 2021), the data collected from over 15,000 people across India revealed that the largest group who incorporated millets into their diet were people with health problems (28%). Health issues were also found to be the single largest reason for consuming millets. Apart from this, people who wanted to lose weight constituted 15% of the people followed by those selecting millets for its taste, who were around 14% of the people. This aligns with the results determined above where diabetes was the most common reason stated by people for opting for millet-based bakery products, followed by people who were concerned about their weight. The study also emphasized that the major reason why people did not consume millets was because it was not eaten at home, which implies that household heads can play a key role in altering the diets and preferences of the people. Thus, improving awareness about millets and making more attractive millet-based products and recipes that are more accessible, could be integral in increasing the popularity of millets in urban homes.

## **SUMMARY OF MILLETS IN BAKERIES**

As discussed above, the key issue with promotion of millets consumption has been the lack of appeal to urban households owing to their unpalatability despite being healthy and nutritious. With an increase in several health issues in urban households across the country, there is a greater demand for healthier food and healthier products to meet a sustainable lifestyle. This demand for healthier alternatives has also introduced changes in the bakery and food sector, with a growing demand for products such as ragi biscuits and oat cookies.

As bakery products are viewed as luxury products in traditional Indian households, urban households are more likely to indulge in cakes, muffins and cookies than rural households. As millets continue to be primarily associated with traditional Indian food recipes, there is a greater need to explore the different bakery products that can be made using gluten-free and protein-rich millets. Awareness about the versatility of millets in recipes and their nutritional benefits can enable the urban household to consume millets in palatable recipes, which will meet both their nutritional and taste requirements. It is also essential to observe that millet-based food is chosen mainly by people afflicted with some illness in urban households. More information about the health-benefits of millets could encourage more healthy people to

consume them to sustain their lifestyle. With more awareness among the consumers, local bakeries across the state would also be encouraged to sell more millet-based products to obtain greater profits.

This case study emphasises that millets are yet to capture a sizable market in the bakery industry as the demand for millet-based products continues to be low in all the bakeries that were surveyed. The promotion of production and consumption of millets in luxury goods, such as cakes, muffins, cookies which mostly appeal to urban people, could encourage more people to eat millets and realise their health benefits and versatility. This would result in an increase in their popularity in both urban and rural households. Thus, increased production and consumption of gluten-free, protein and fibre-rich millets could be a potential remedy to the rising health issues in urban lifestyle.

## **SCOPE FOR FURTHER STUDY**

This case study constitutes only six bakeries across Bhubaneswar and Cuttack. Conducting a large-scale across Odisha and including both online businesses and physical local bakeries could capture the demand of both urban and rural areas. As the data for this study involves bakeries which have only operated for less than or equal to a year, including bakeries which have operated for over two to three years can allow us to study a trend in customer demand for healthy bakery products over time as well as changes in the demand of customers during the COVID-19 lockdown. To understand the customer behaviour on a larger scale, assessment of demand for regular Indian food items and other products could further reveal how urban and rural households perceive millets and how they prefer to consume it.

## **OTHER AREAS OF WORK**

### **[1] Health and Nutrition Indicators**

One of the key areas in which I worked for three months was assisting Ms. Rashmi Rekha Samal in the analysis and determination of indicators that affect the health of women and children in the states of Odisha and Sikkim. Despite there being several struggles to extract the exact data required and to ensure that it was consistent with the NFHS factsheet, we were able to succeed in determination of several factors. The entire internship enabled me to understand data and helped me learn new methods to approach the data. While working with data was challenging at times, it was an extremely crucial lesson to learn to be able to analyse it correctly.

Some of the indicators that were determined are listed below.

Table 5: Indicators for Mother

Mother		INDIA			ODISHA			SIKKIM		
		Mean	SD	N	Mean	SD	N	Mean	SD	N
	Age	27.334	5.276	204708	27.718	5.415	9657	28.37063	5.312	1011
<b>Education</b>	No education	27.8		204708	26.67		9657	11.62		1011
	Incomplete primary	5.98			8.54			10.82		
	Complete primary	7.48			5.88			8.5		
	Incomplete secondary	37.64			47.35			49.99		
	Complete secondary	9.11			5.19			9.81		
	Higher	11.99			6.38			9.26		
<b>Place of residence</b>	Urban	30.2		204708	15.45		9657	33.95		1011
	Rural	69.8			84.55			66.05		
<b>BMI</b>	Overweight	16.88		201923	15		9,552	30.19		1002
	Underweight	23.43			26.59			4.83		
	Normal weight	59.7			58.41			64.98		
<b>Household Wealth</b>	Poorest	22.88		204708	37.37		9657	0.69		1011
	Poorer	20.93			25.75			8.54		
	Middle	19.85			19.57			45.83		
	Richer	19.22			11.35			36.00		
	Richest	17.12			5.96			8.94		
<b>Sex of Child</b>	Male	52.12		244057	51.77		10430	55.45		960
	Female	47.88			48.23			44.55		

Mother		INDIA			ODISHA			SIKKIM		
		Mean	SD	N	Mean	SD	N	Mean	SD	N
Caste/Tribe	Caste	88.18		204032	81.05		9,640	80.87		1007
	Tribe	7.2			16.99			17.32		
	No Caste/Tribe	3.87			1.8			1.82		
	Don't know	0.75			0.17			-		
Owns a house alone or jointly	does not own	61.90		35817	36.68		1604	78.43		190
	alone only	8.50			32.73			6.03		
	jointly only	16.76			19.83			12.33		
	both alone and jointly	12.84			10.75			3.21		
Owns a land alone or jointly	does not own	70.03		35817	52.76		1604	79.03		190
	alone only	5.97			22.63			4.74		
	jointly only	13.39			15.89			12.85		
	both alone and jointly	10.61			8.71			3.39		

The table above considers “Mother” as the main variable where “Mother” includes women who have children less than 5 years of age and are married or living with a partner. These women include both currently pregnant and non-pregnant women. Thus, out of 6,99,686 women across India, according to NFHS-IV Data, 2,04,708 belong to the variable “Mothers”. Similarly, out of 33721 women in Odisha, 9657 women belong to this category and out of 5293 women in Sikkim, 1011 women belong to this category.

Out of 204708 mothers in India, 37.64% of these women have incomplete secondary education and only 9.11% have complete secondary education. It is found that 27.8% of these mothers have no education. Out of all the mothers in India, 69.8% of them belong to rural households. Compared to this, 84.55% of mothers in Odisha belong to rural households whereas in Sikkim, 66.05% of the mothers belong to rural households. Most of the mothers in India (22.88%) and Odisha (37.37%) belong to the poorest category. In India, 19.85% belong to middle category and 17.12% belong to the richest category.

Sample size is much lower for data on whether the mothers own a house or land. Out of 35817 women in India, 61.90% do not own a house alone or jointly and 70.03% do not own land alone or jointly. 12.84% own a house both alone and jointly whereas 10.61% own land both alone and jointly. Out of 1604 women in Odisha, 36.68% do not own house alone or jointly, whereas 52.76% do not own land alone or jointly. 32.73% own house alone and 22.63% own land jointly. In Sikkim, 78.43% women do not own a house and 79.03% do not own any land. Only 6.03% own a house alone and only 4.74% own land alone.

The other indicators, variables and the final coding of variables that were determined are currently being improved upon and will be finalised under the discretion of Ms. Rashmi Rekha Samal.

## [2] Indian Patriarchy Index

Based on the paper *“Development of the India Patriarchy Index: Validation and Testing of Temporal and Spatial Patterning”* (Singh A. et al, 2021), I reconstructed the Indian Patriarchy Index and performed a state-wise distribution of all its components under the guidance of Professor Srijit Mishra. This assignment could not have been completed successfully without the guidance of Dr Kaushlendra Kumar who provided invaluable help for resolving any issues related to coding and extracting data.

The components were replicated and were determined as below. These values were found to be consistent with the values determined in the original paper.

Table 6: Indian Patriarchy Index

<b>Male Domination</b>	• Female Heads	14.53
	• Young Brides	17.85
	• Older Wives	2.13
<b>Generational Domination</b>	• Younger Household Head	21.44
	• Neo-local	40.89
	• Joint Family	7.27
<b>Patrilocality</b>	• Married Daughter	13.88
<b>Son Preference</b>	• Boys as last child	60.86
	• Sex Ratio	108.49
	• Ideal Number of Sons	19.98
<b>Socioeconomic Domination</b>	• Educated Wives	22.56
	• Economic Domination	4.79

### [3] Miscellaneous Work

Under the guidance of Ms. Diptimayee Jena, I reviewed reports on Area, Yield, Production and Value of Produce under Odisha Millets Mission in the years 2017-2018 (Directorate of Agriculture and Food Production, Bhubaneswar, 2019), 2018-2019 (Directorate of Agriculture and Food Production, Bhubaneswar, 2020) and 2019-2020. This provided me with great insight into the workings of Odisha Millets Mission (Directorate of Agriculture and Food Production, Bhubaneswar, 2019) and the range of the work done by the organisation. I was able to learn about the crop cutting experiments under Odisha Millets Mission (Mishra, 2020) and learn about sampling techniques as well as method of cultivation covered in the reports in Kharif and Rabi. Some of the millets covered in the reports include *mandia*, *suan*, *kangu*, *janha*, *khira* and *bajra*. A detailed look into the yields of various millets across different districts in Odisha allowed me to understand the scope of work done by Odisha Millets Mission.

## CONCLUSION

This internship provided me with immense knowledge and great insight into different aspects of research. I was able to attend several informative workshops, (UNFSS Dialogue on Women's Agency and Gender Equity in Food Systems, JRAI Special Issue Launch 2021, etc) where I interacted with various professionals across the globe and drew motivation from their experiences.

The case study report allowed the exploration of different research areas and allowed me to present one that deeply interested me. Working on the report enabled me to approach research from a ground level as I had the opportunity to prepare my own questionnaire and find suitable bakeries to help me collect data for the purpose of the study. Apart from gaining technical knowledge in terms of various regression and analysis techniques, this internship showed me how to practically approach problems. I felt extremely honoured to be able to learn so many valuable lessons through my project work.

As most of my work was centred on analysis of data, I was able to learn new tools and techniques which have refined my approach towards data. Ultimately, through different projects and assignments, I was introduced to different aspects of research which not only provided me with invaluable knowledge but also motivated me to work in the field of research and contribute to a good cause. I hope that the lessons and the experiences that I gained during the past three months will enable me to work and contribute better to the field of research.



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