A STUDY ON MILK QUALITY PARAMETERS AND CONSUMER UTILIZATION PATTERNS: AN ANALYTICAL SURVEY OF LUCKNOW CITY

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Abstract

Milk is very essential constituent of Indian diet and a major nutriment, but the supremacy over its quality and safety is still in question in the urban markets. In this research, the quality parameters of marketed milk in Lucknow city were evaluated with a focus on physico-chemical as well as microbiological properties of the milk. A total of fifty milk samples were tested in terms of solids-not-fat (SNF), specific gravity, coliform count, the growth of yeast and molds. It was found that a substantial number of the samples fell below the acceptable range of SNF and specific gravity, which is the potential dilution or adulteration. The review of microbiology revealed that over half of the samples were contaminated with coliforms and 40% were contaminated with yeast and mushroom, indicating that that there is lack of hygienic handling and storage. In sum, it would be expected that despite the fact that milk consumption in Lucknow broadly meets the established standards, the risk remains high because of some microbial infection and lack of product consistency. The paper highlights the need to enforce the existing regulations more strictly, enhance supply chain hygiene, and better-informed consumers who can consume safe and wholesome milk in urban centers.

Keywords- quality, SNF, Specific gravity, Coliform count, Yeast and mold, Adulteration, Lucknow, Consumer safety.

1. INTRODUCTION

Ability of milk to be referred to as a complete food, milk has successfully maintained an unsurpassable role in the Indian cuisine based on its nutritive value and cultural status. Consumption of milk has a close relationship with regular dietary intake, traditional practices,

as well as lifeway trends of urban and rural households besides being a source of major protein, calcium, and vitamins. India is the highest milk producing and consuming country on the world; therefore, it gives an exclusive context where, the problem of quality, safety, and use of milk gets aligned on the subject of rapid urbanization and altered consumer demands.

The consumer demand of milk in metropolitan centers like Lucknow is molded by nutritional value of milk as well as its purity factors, price and convenience. Since the presence of packaged pasteurized milk, toned products, and loose/raw supply co-exists, there is a range of socio-economic reasons that may shift the consumer preference, covering a wide array of factors that include the trust in the traditional vendors, reliance on branded food to ensure its safety and hygiene conditions. Concurrent rise in awareness about adulteration, microbial infections and unchanged standards of quality has elicited high sensitivity on the part of people in relation to the safety of milk.

1.1. Linking Milk Quality with Consumer Utilization Patterns

The quality of milk cannot be considered in separation to the research on the perception and usage of the milk among the consumers because those factors are directly interconnected. Such parameters as laboratory or scientific tests do not always form the basis of judgment by consumers that are based, instead, on factors which are practical and which include freshness, fat, taste, texture, and shelf life. These attributes are the nearest and most practical factors of consumer satisfaction and, therefore, their purchases. In addition to these attributes provided by product, there is also wider influential of the socio-economic factors. The prices of the packaged or branded milk in relation to loose or raw milk sold by local vendors are determined by the level of income of the households in the area. Equally, the health and nutrition awareness, which is influence most of the time by the establishment of education and the dissemination of information through media, affects the choice of standardized and quality assurance milk products as well. The demand aspect likes family size and their consumption requirement also influences the buying behavior, to the extent that large households may give preference to quantity and affordability and the small households may be giving preference to convenience and guaranteed safety checks.

These dynamics become especially important in a city such as Lucknow, where households live in an urban environment where they must choose between their traditional lifestyles and modern lifestyles. Old school attachment to the local milkman (out of habit and familiarity), and trust, is matched by the increasing trend to purchase processed and package milk, as the

symbol of health, high standards, reliability and brand assurance. Such a coexistence is indicative of the larger-scale socio-economic changes, i.e., increased levels of disposable incomes, modernisation of lifestyle and enhanced consumer awareness. Examining the relationship between the parameters of milk quality and the pattern of use, therefore, offers not just a definite image of the purchasing behavior, but also the useful information on the changing market trends. The importance of such an inquiry lies with the fact that it points out both to the considerations of nutritional sufficiency and health safeguarding of the population and charting of the changing socio-economic boundaries that affect dairy intake in the enlarging urban reality.

2. REVIEW OF LITERATURE

Harwood and Drake (2018) distinguished and profiled the groups of buyers of fluid milk in the United States. In their research they wanted to focus on the idea that the consumer choice depends very strongly on the sensory characteristics like taste and freshness, along with the socio-demographic factors. The results emphasized the need of consumer segmentation on the understanding of utilization pattern and marketing plans formulation.

Merlino et al. (2021) considered the determinants of consumer choices when it comes to buying milk, and its fresh, pasteurized, pasteurized, and UHT products. The authors stated that the attributes like safety, shelf life, nutrition, and labeling data had a strong impact on consumer choice. They also presented specific profiles of consumers thus highlighting the fact that the behavior of purchase was a combination of the attributes of the products and the level of awareness of the individual.

Krishnadas (2015) examined the Kerala milk and milk products consumption pattern using the economic aspect of it. The analysis found that household income, the family size and the urban rural disparities contributed significantly in influencing the level consumption and products preferences. It also stated that socio-economic elements were a determinant in determining the demand of various kinds of milk and dairy products.

Kurnianto et al. (2020) provided a research study about the perception of the consumer of soybean milk quality carried out by Importance Performance Analysis (IPA). The results were that the consumer tested the quality of soybean milk by considering aspects like the taste of the milk, nutritive nature and affordability. Though the study aimed to shows how consumers tend to make decisions based on accepting the assumptions of a particular quality of plant-based

alternative to milk, the study brought added value to the analysis of quality multi-attributes of dairy milk consumption preferences as well.

3. RESEARCH METHODOLOGY

The present study adopted a structured methodology to assess milk quality parameters and examine consumer utilization patterns in Lucknow city. By combining laboratory-based evaluation of milk samples with secondary data analysis, the approach ensured both scientific objectivity and contextual understanding of consumer behavior.

3.1. Research Design

An analytical–descriptive research design was employed. Experimental methods were used to test the physical and microbiological quality of milk samples in laboratory conditions, while descriptive analysis was applied to interpret consumption patterns based on secondary sources.

3.2. Sample Size and Sampling Technique

Geographically, 50 milk samples were collected through a purposive sample so as to cover the common categories of milk consumed in Lucknow. These are packaged pasteurised milk, loose/raw milk with the local vendors, toned/double-toned milk and other milk products.

3.3. Data Collection

Laboratory tests were carried out to generate data and these tests targeted important physico-chemical parameters (solids-not-fat, specific gravity and freezing point), microbiological quality (coliform count and yeast/mold detection) and screening of necessity of adulteration (with starch, detergent, urea and neutralizers). The secondary data concerning the usage patterns of the consumers was based on white papers provided by the government, published scientific reports, and dairymen analyses, as it allowed to determine what type of milk is the most or least popular and what is the development of the use of different milk in urban population.

3.4. Data Analysis

Statistical analysis was done through descriptive statistics. The calculation of frequencies and percentages was done with the aim of classifying the samples on the basis of the set standards. The results of the whole process were illustrated and given in the form of tables and simple graphical means allowing to understand and compare.
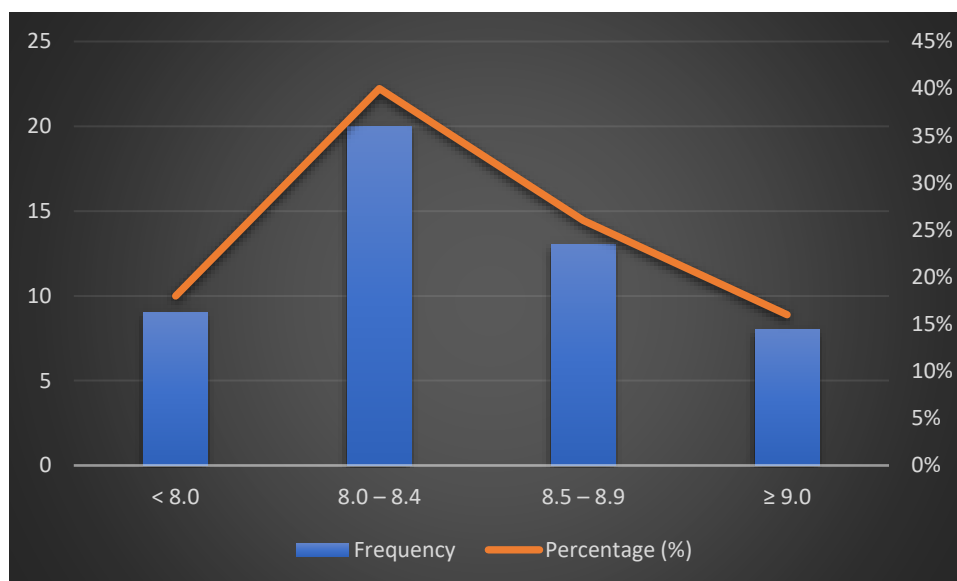
4. DATA ANALYSIS

The analysis of milk quality in Lucknow was carried out using key physico-chemical and safety indicators. The findings are presented through frequency–percentage tables to ensure clarity and systematic interpretation.

Table 1: Distribution of Solids-Not-Fat (SNF) Content in Milk Samples

SNF (%)	Frequency	Percentage (%)
< 8.0	9	18%
8.0 – 8.4	20	40%
8.5 – 8.9	13	26%
≥ 9.0	8	16%
Total	**50**	**100%**

Table 1 shows that 40% of milk samples had SNF values between 8.0–8.4%, which lies within the acceptable range. About 26% of samples were in the higher range of 8.5–8.9%, while 16% exceeded 9.0%, reflecting good quality. However, 18% of samples recorded SNF below 8.0%, indicating possible dilution or substandard quality.

Figure 1: Graphical presentation of Distribution of Solids-Not-Fat (SNF) Content in Milk Samples
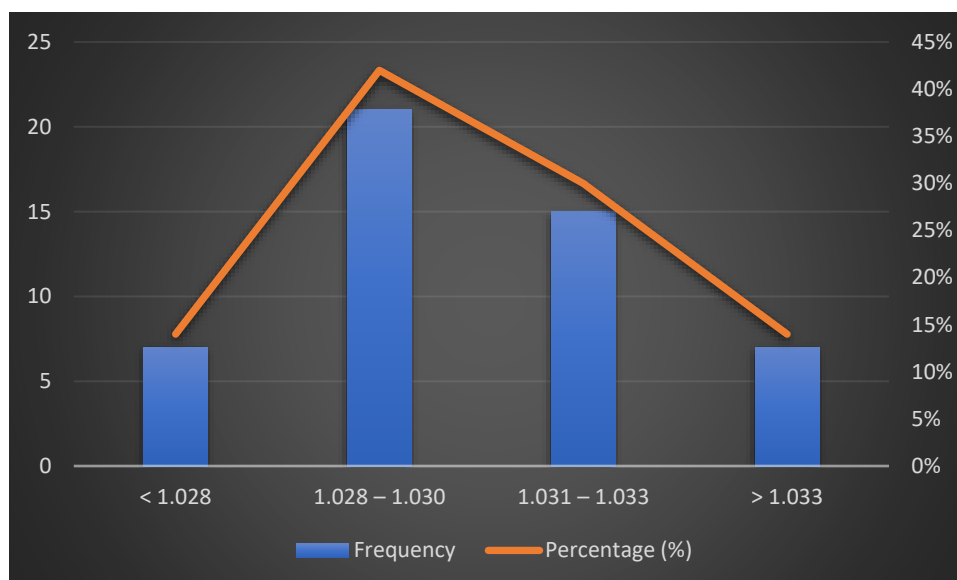
Figure 1 presents 40% of samples had SNF between 8.0–8.4%, falling within acceptable limits. However, 18% were below 8.0%, suggesting dilution or compromised quality.

Table 2: Specific Gravity of Marketed Milk

Specific Gravity	Frequency	Percentage (%)

< 1.028	7	14%
1.028 – 1.030	21	42%
1.031 – 1.033	15	30%
> 1.033	7	14%
Total	**50**	**100%**

Table 2 shows that the majority of milk samples (72%) had specific gravity values within the normal range of 1.028–1.033, indicating acceptable quality. About 14% of samples recorded values below 1.028, suggesting possible water addition or dilution. Another 14% showed values above 1.033, which may be due to the addition of solids or adulterants.
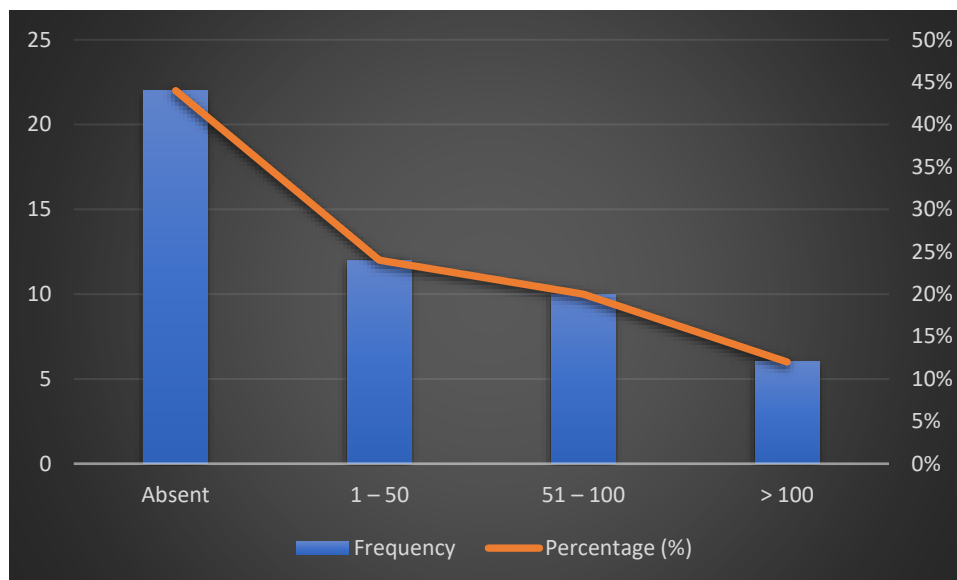

Figure 2: Graphical presentation of Specific Gravity of Marketed Milk

Figure 2 presents Most samples (72%) were within the normal range (1.028–1.033). Deviations below 1.028 indicated possible water addition, while values above 1.033 hinted at added solids.

Table 3: Coliform Count in Milk Samples

Coliform Range (cfu/ml)	Frequency	Percentage (%)
Absent	22	44%
1 – 50	12	24%
51 – 100	10	20%
> 100	6	12%
Total	**50**	**100%**

Table 3 shows that 44% of milk samples were free from coliforms, indicating good hygienic handling. However, 56% of samples showed varying levels of contamination, with 24% having 1–50 cfu/ml, 20% recording 51–100 cfu/ml, and 12% exceeding 100 cfu/ml.

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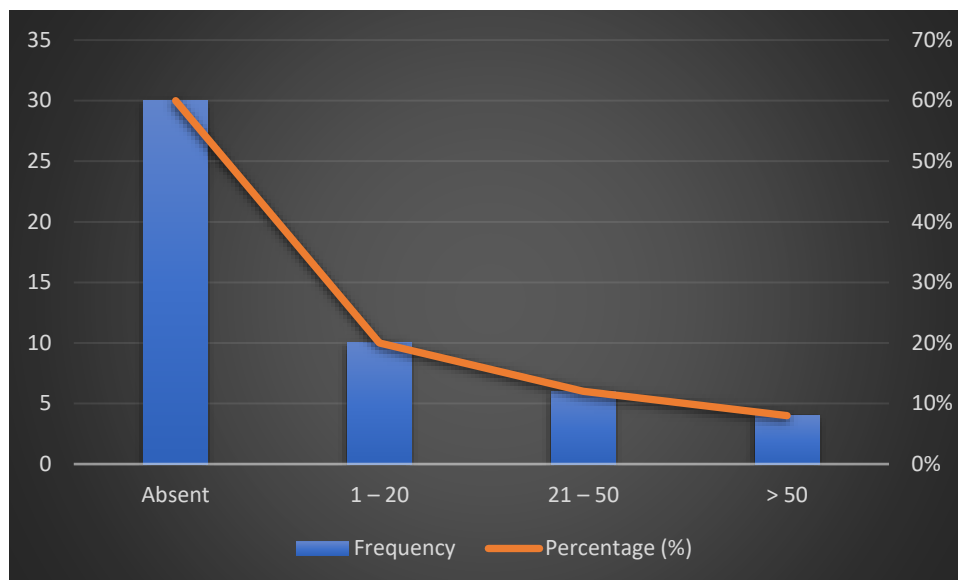
Table 3 shows 44% of samples were free from coliforms, indicating hygienic handling. However, 56% showed varying levels of contamination, reflecting lapses in sanitation during storage and distribution.

Table 4: Yeast and Mold Count in Milk Samples

Yeast & Mold Count (cfu/ml)	Frequency	Percentage (%)
Absent	30	60%
1 – 20	10	20%
21 – 50	6	12%
> 50	4	8%
Total	**50**	**100%**

Table 4 shows that 60% of milk samples were free from yeast and mold, reflecting satisfactory quality and proper storage. However, 40% of the samples exhibited fungal growth at different levels, with 20% having 1–20 cfu/ml, 12% recording 21–50 cfu/ml, and 8% exceeding 50 cfu/ml.

Figure 4: Graphical presentation of Yeast and Mold Count in Milk Samples

Figure 4 shows majority (60%) of milk samples were free from yeast and mold. Yet, 40% recorded fungal presence, raising concerns about prolonged storage or inadequate refrigeration.

5. CONCLUSION

The study indicates that there is a tremendous Rs. variation between quality of marketed milk samples in Lucknow. Most of the samples met the acceptable level of standards of solids-not-fat (SNF) and specific gravity, deviations in some cases indicated being either diluted or added with extraneous solids. The microbiological tests indicated that over 50 percent of the samples contained coliform contamination, and out of these, more than forty percent indicated the presence of yeast and mould, a factor that points to poor hygienic handling, storage and distribution. These results show that though most of the milk present in the city is within the acceptable limits of quality many of them still present a potential threat to their consumers on the basis of microbial contamination and irregularity in composition. The findings highlight that there is a necessity to intensify regulatory oversight, improve handling procedures, and inform the consumers to ensure sound nutritious milk supply within urban markets such as Lucknow.

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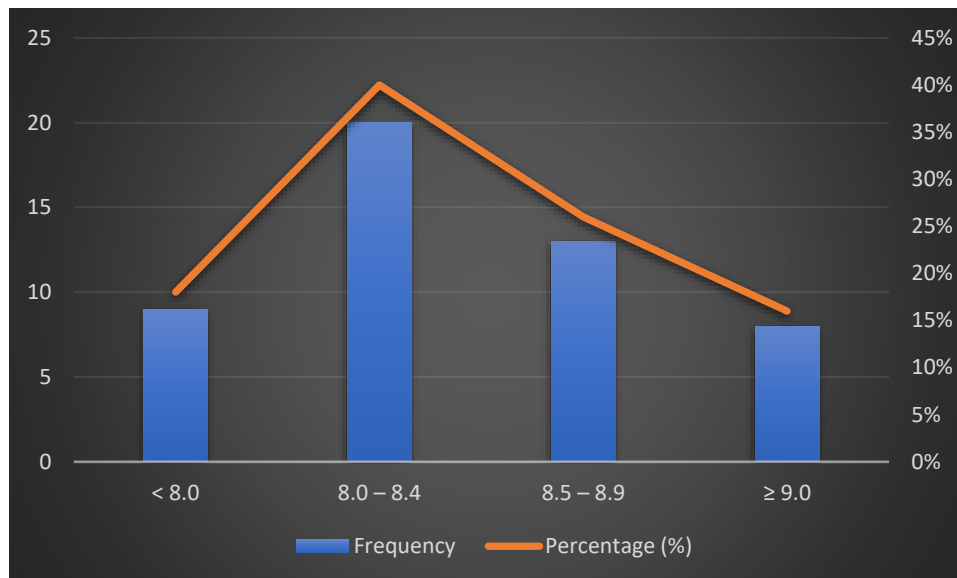
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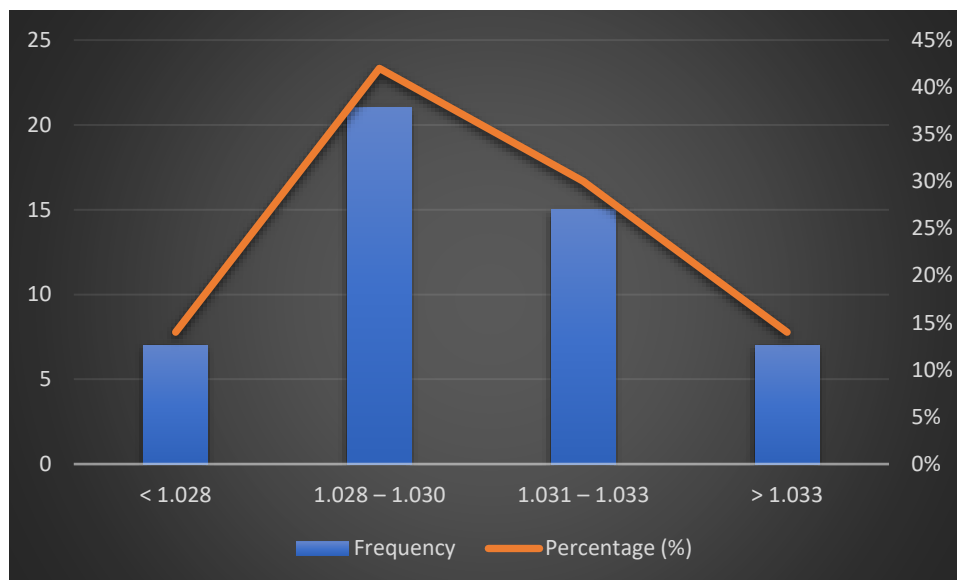

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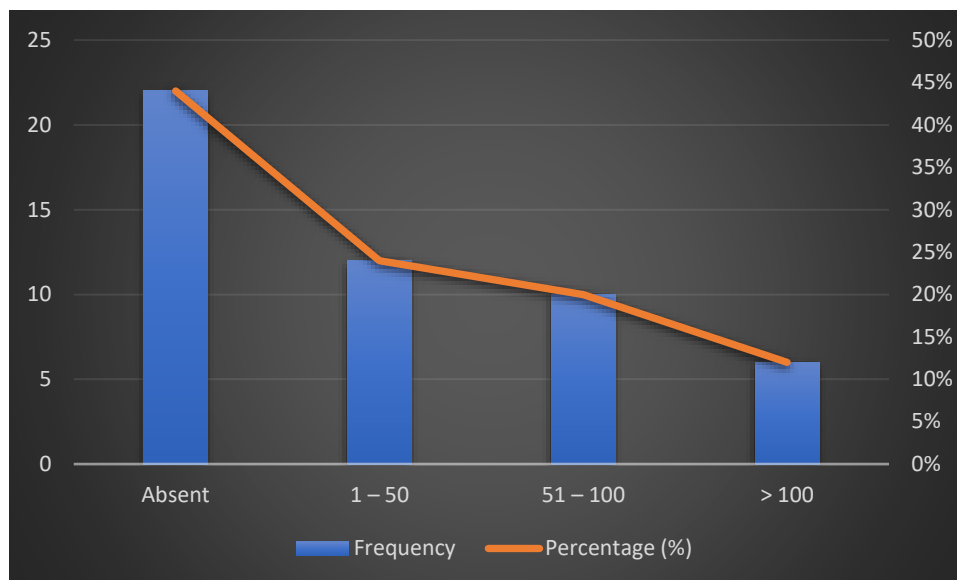
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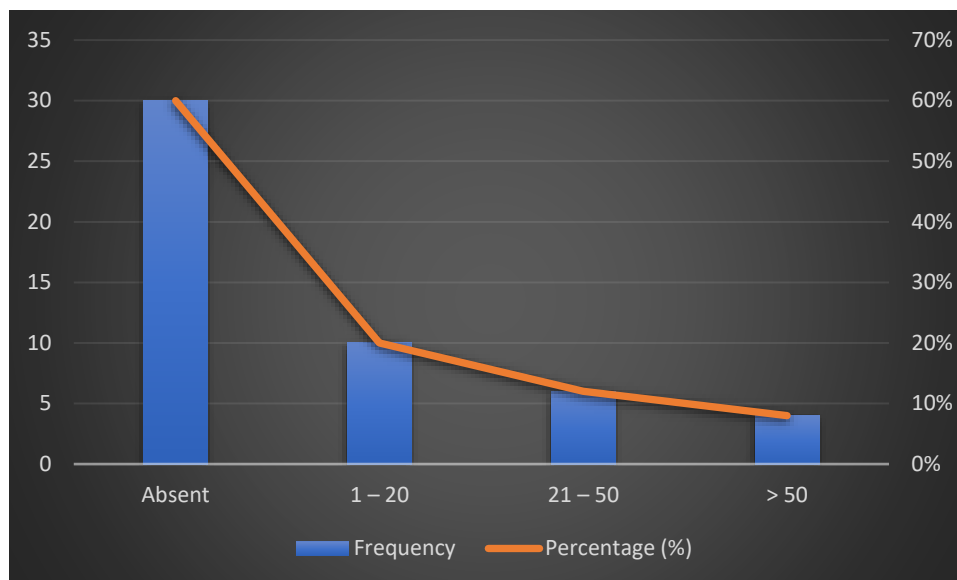
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