PROTEIN SUPPLEMENTATION: REGULATORY FRAMEWORK AND CONSUMER PERCEPTION






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Executive Summary

The National Family Health Survey (NFHS – 5) reported that the consumption of a wide variety of nutritious foods is important for public health. A well-balanced diet is required for adequate amount of protein, fat, carbohydrates, vitamins, and minerals. However, there are a number of factors responsible for distinct dietary patterns and intake of a balanced diet. The employment status, palatability, dietary needs and convenience are significant in ensuring nutrient intake by an individual. Specifically, there have been mixed perceptions regarding the intake of protein via several sources. Therefore, emphasizing on this crucial nutrient, protein intake and consumer perception, this report will explore the significant role of protein supplementation along with the regulatory framework and consumer perception of such foods. Protein, as a fundamental macronutrient, supports vital bodily functions such as muscle growth, enzyme and hormone synthesis, and overall metabolic health. The report also highlights the diverse sources of protein, including conventional foods and health supplements most commonly opted by individuals to meet their daily needs. Additionally, the document will also emphasize on the importance of meeting Recommended Dietary Allowances (RDA) as per ICMR guidelines to avoid deficiencies or excess consumption. A comparative analysis of global regulatory framework and India's FSSAI regulations reveals variations in product classification, labelling requirements, and permissible health claims. The survey examines protein supplement usage patterns, analyzing respondents' behaviour and awareness levels. It also assesses the meal replacement trends and dietary protein intake. The survey explores purchasing behaviour, familiarity with protein types, and understanding of FSSAI regulations and label claims. Additionally, it identifies consumer concerns related to side effects, costing, and misleading claims while evaluating the preferred supplement forms and protein sources.

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List of Abbreviations

ACRA	Accounting and Corporate Regulatory Authority
CAC	Codex Alimentarius Commission
DIAAS	Digestible Indispensable Amino Acid Score
DGI	Dietary Guidelines for Indians
DRR	Disease Risk Reduction
DSHEA	Dietary Supplement Health and Education Act
EAAs	Essential Amino Acids
EAR	Estimated Average Requirement
EC	European Commission
EFSA	European Food Safety Authority
EU	European Union
FAO	Food and Agriculture Organization
FBO	Food Business Operator
FDA	Food and Drug Administration
FDA Philips	Food and Drug Administration of the Philippines
FDAMA	Food and Drug Administration Modernization Act
FSDU	Food for Special Dietary Use
FSMP	Foods for Special Medical Purpose
FSSAI	Food Safety and Standards Authority of India
FTC	Federal Trade Commission
g/d	Grams per Day

g/kg/d	Grams per Kilogram per Day
HSA	Health Sciences Authority
HS	Heath Supplements
IAA	Indispensable Amino Acid Score
ICMR	Indian Council of Medical Research
INS	International Numbering System of Food Additives
Kcal	Kilo Calorie
MHLW	Ministry of Health, Labour and Welfare
MJ	Mega Joule
NIN	National Institute of Nutrition
NLEA	Nutrition Labeling and Education Act
NMPA	National Medical Products Administration
NRV	Nutritional Reference value
PE Ratio	Protein Energy Ratio
Pre-Pro	Prebiotic and Probiotic food
PDCAAS	Protein Digestibility Corrected Amino Acid Score
RDA	Recommended Dietary Allowance
RTD	Ready-to-Drink
SFA	Singapore Food Agency
USA	United States of America
USD	United States Dollar
WHO	World Health Organization

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Introduction

It is well established that a sufficient supply of essential nutrients, including both macronutrients and micronutrients, are required for maintaining vital organism function. Each nutrient plays a significant role to support the overall metabolism of the body. For example, macronutrients like carbohydrates and fat are essential energy sources for the body. On the other hand, protein is essential for muscle building, repairing and supporting the growth and development of the body. Since protein and energy co-exist in foods, a rational and holistic way to view protein requirement is essential. As rightly mentioned in the Dietary Guidelines for Indians 2024, no single food can provide all such necessary nutrients and hence these need to be obtained through a judicious choice of a variety of foods.[18] Considering the Indian scenario, accessibility is a bigger issue. As a result, people have now begun to supplement their diet along with consuming protein from conventional sources.

Proteins play a vital role in the body by supporting numerous functions, such as the formation of enzymes, hormones, cell membrane components, and carrier proteins like hemoglobin, which transports oxygen to tissues. The human body requires only 20 amino acids to function properly, out of which 9 are essential amino acids (EAAs) that must be obtained through the diet. The dietary protein is important for building muscles and bones, especially in growing children. Therefore, a diet that provides all 20 amino acids, including the 9 EAAs, is considered a source of good quality protein.[18]

Earlier, consuming protein supplements was a very common practice among gym goers and people focused on muscle building and resistance training. However, these are well accepted by people with busy lifestyle today. Such supplementation also fulfills the daily requirement of an individual's protein intake that could not be fulfilled through their common diet. Further, a large segment of the population also consumes supplements for weight management or other likely health benefits. Nevertheless, these supplements have several benefits when used correctly. However, it is important to note that the excess consumption of protein supplements could be harmful for health.[20] Therefore, high-protein diets should be approached with caution in individuals to avoid any potential health implications.

The nutritional supplements market in India is growing rapidly because more people are becoming aware of health and fitness, and these products are easier to find. Even during the COVID pandemic, consumer demand increased, leading to a large growth in the worldwide nutraceutical industry, which grew from USD 320 billion in 2020 to USD 352.92 billion in 2021. By the end of 2028, it is anticipated to have grown to USD 658.11 billion[19], with a compound annual growth rate of over 9%[23]. In view of the data available, the report will focus on both conventional and health supplement formats opted by individuals to fulfill their daily protein requirements. Further, the consumer perception survey will enable a great understanding of consumer behaviour and awareness of such products.



Protein: the building block of life

2.1 What is Protein?

Protein is made up of small units known as amino acids, which are linked by peptide bond. There are total 20 amino acids, out of which nine amino acids are referred to as essential amino acids. These are tryptophan, lysine, methionine, phenylalanine, threonine, valine, leucine, isoleucine, and histidine. Since these cannot be produced by the human body, it is necessary to obtain such amino acids from various dietary sources. On the other hand, non- essential amino acids can be produced by our bodies and are mostly utilized in protein synthesis. Some examples of non-essential amino acids include alanine, glycine, tyrosine, etc.[18]

1 g of protein gives 4 kcal of energy

2.2 Functions and Importance in Human Nutrition

- Essential for growth, maintenance, and repair of body tissues.
- Required for the synthesis of vital biomolecules such as enzyme, hormone, antibodies, and haemoglobin.
- Contributes significantly to blood coagulation.
- Acts as an energy source when necessary, providing 4 kcal per gram.[18]

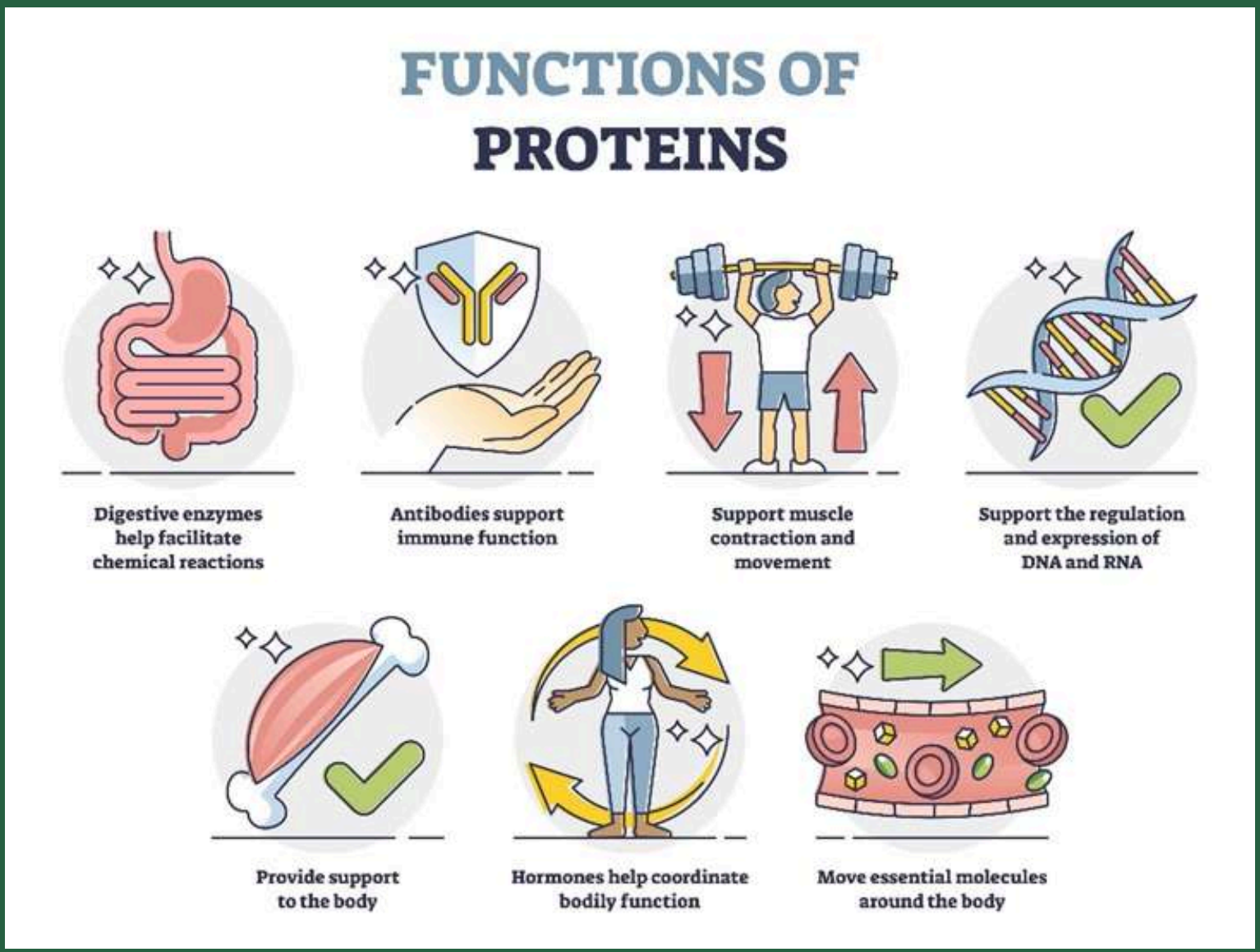


Figure 1: Functions of Proteins

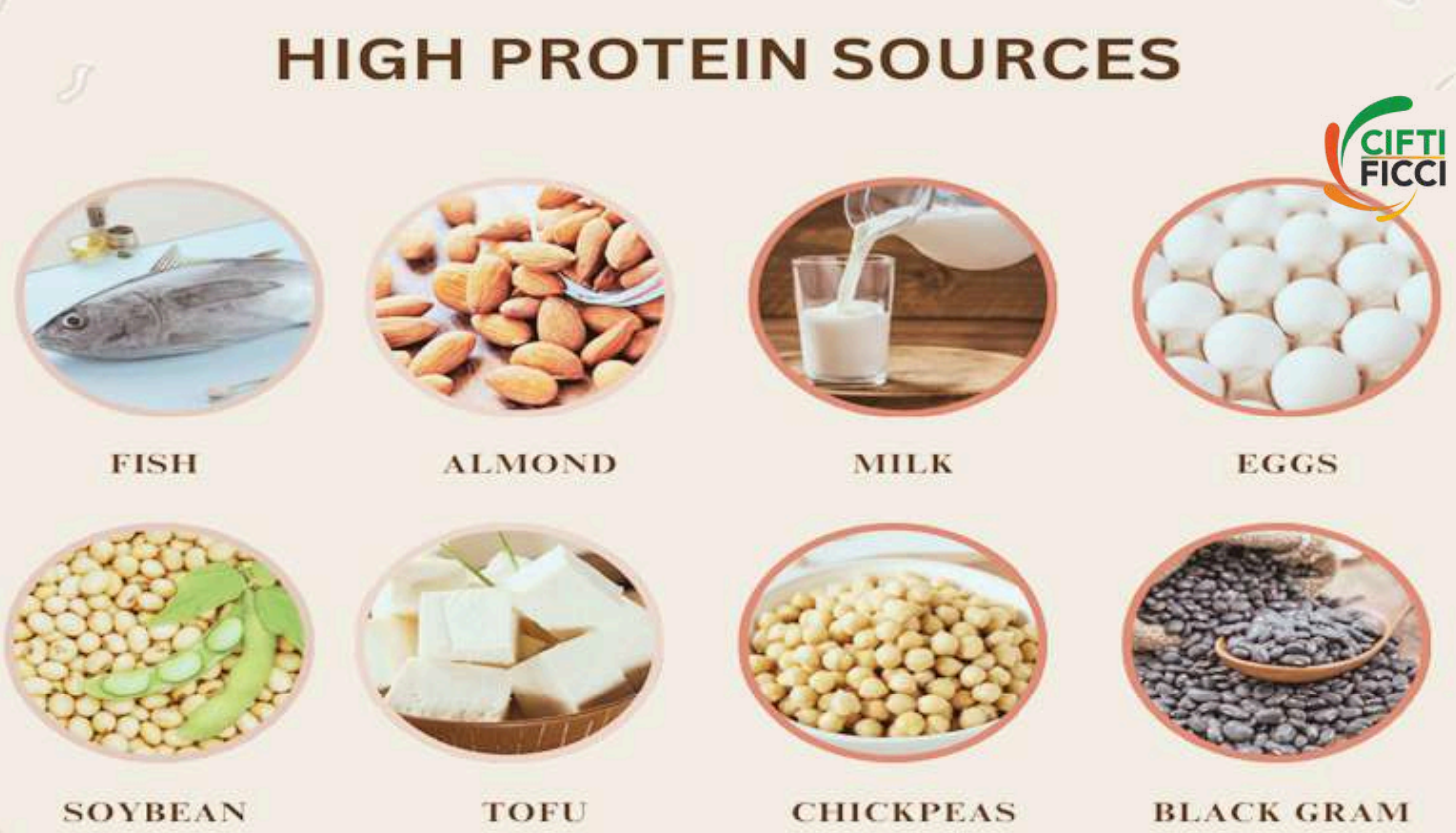


Figure 2

2.3 Dietary Sources of Protein

Conventional Sources of Protein

Proteins are obtained from both plant and animal sources in the diet. Conventional sources of protein include a variety of foods consumed regularly such as meat, poultry, fish, eggs, and milk, which are derived from animals and are high quality proteins because they contain all the required amino acids.

Plant-based sources include cereals, pulses like lentils, green gram, horse gram, black gram, chickpeas, kidney beans, cowpeas, soybean, and green peas, which are particularly important in vegetarian Indian diets. Nuts and seeds that are high in protein include almonds, pistachios, cashews, walnuts, hazelnuts, chia seeds, pumpkin seeds, flax seeds, and sesame seeds. Cereal proteins are generally deficient in lysine and pulses, or legume proteins contain low amounts of methionine. However, when both cereals and pulses (legumes) are present in the diet in proper proportions, proteins from these two sources complement each other by providing lysine or methionine to a significant extent to meet the requirement of the nutrient.[18]

Protein Sources Used for Food Supplements

Protein supplements are derived from both plant and animal sources and are commonly used to support protein intake in the diet. Among the plant sources, soy protein isolate has the highest protein content i.e., around 90% on a dry weight basis.[2] At the same time, consumers opt for a number of animal-based protein sources for the purpose of supplementation. These include whey, casein, egg white, etc. Out of all the animal sources, it is well established that whey protein isolate has the highest protein content of around 90–95%, with very little fat or lactose.[1]



In India, it has been a practice in the National Statistics Office (NSO) to bring out a comprehensive report providing information on nutritional intake by the Indian population with detailed break-up of estimates of per capita intake of energy (Calorie), protein and fat and its distribution over households and persons.

Very recently, the Ministry of Statistics and Programme Implementation (MoSPI) released its Household Consumption Expenditure Survey (HCES) that was conducted in two phases, from August 2022 to July 2023 and then from August 2023 to July 2024, to collect data on household food consumption. The findings from these surveys have been compiled and published in a report titled "Nutritional Intake in India." This report, released by the statistics office, highlights the daily protein intake by individuals in both urban and rural India has shown a consistent increase since 2009-10, a trend that is evident across most major states (Rajasthan, Haryana, Maharashtra and UP).

The survey provides with the data for average protein intake per capita per day in 2009-10 to 2023-24 in both rural and urban areas of India.

The survey, and specifically the comparison for per capita per day protein intake in rural and urban areas was essential to identify the overall trend for protein intake in Indian population.

Rural Protein Intake

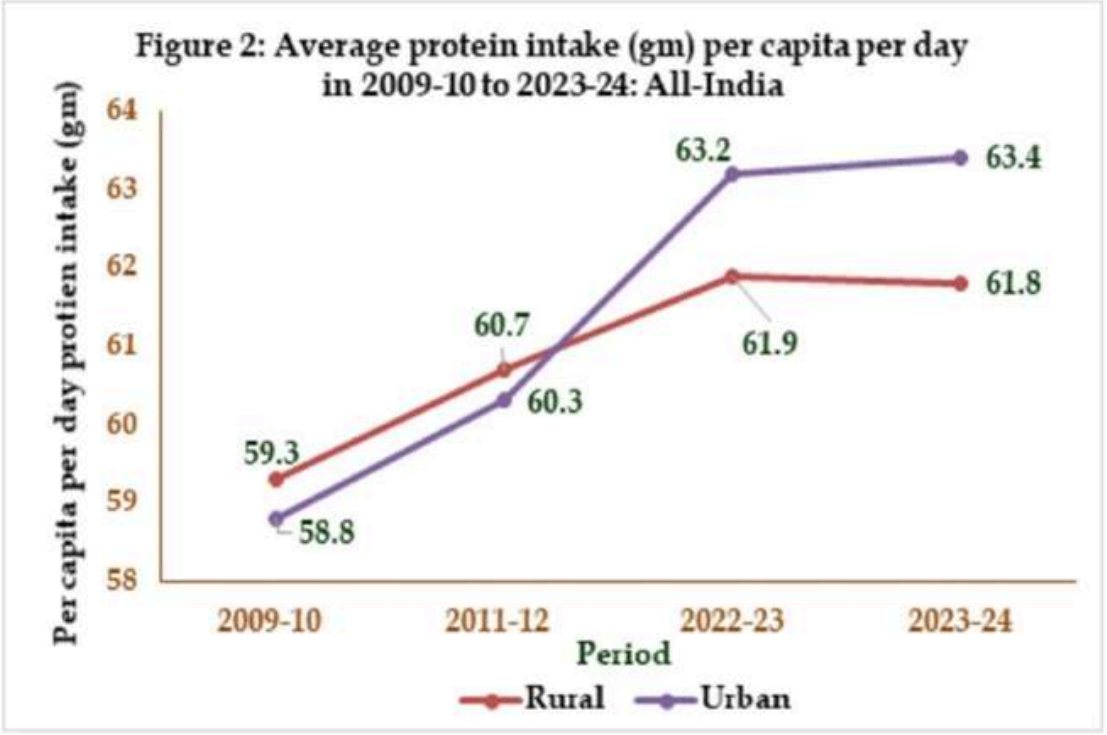
In rural India, the average per capita per day protein intake shows a generally increasing trend over the observed periods. Starting at 59.3 gm in 2009-10, it rose to 60.7 gm in 2011-12. The intake further increased to 61.9 gm in 2022-23. However, a marginal decline was observed in the most recent period, with the rural protein intake decreasing slightly to 61.8 gm in 2023-24.

Urban Protein Intake

For urban India, the average per capita per day protein intake demonstrates a consistent upward trajectory across all periods. Beginning at 58.8 gm in 2009-10, it increased to 60.3 gm in 2011-12. A notable jump occurred between 2011-12 and 2022-23, with urban protein intake reaching 63.2 gm. The upward trend continued into 2023-24, where the protein intake further slightly rose to 63.4 gm.

Comparison and Overall Trends

Initially, in 2009-10 and 2011-12, rural protein intake was slightly higher than or very close to urban intake. However, by 2022-23, urban protein intake surpassed rural intake and maintained a slightly higher level in 2023-24. Overall, both sectors show a positive trend in protein intake over the 14-year period depicted, with urban areas demonstrating a slightly stronger and more consistent increase in the later periods compared to rural areas' minor decline from 2022-23 to 2023-24.



Source: Press Information Bureau (PIB)

2.4 Recommended Daily Intake and Deficiency (ICMR)

Nutritional status is measured by the amount of calories, carbohydrates, minerals, proteins, vitamins, etc. that is consumed by the person per day. When insufficient or over consumption of such amounts occur, the health problems associated with under nutrition or over nutrition, respectively, affects the growth, development and well-being of an individual. Therefore, it is essential to emphasize on the recommended daily intake of a nutrient.

As per ICMR, RDA refers to the daily dietary nutrient intake level of nearly all healthy individuals in a particular life stage and gender group. It is intended for the purpose of supervised supplementation in deficient individuals or conditions.[17]

The ICMR-NIN 2020 Expert Group has followed the FAO/WHO/UNU (2007) guidelines to establish protein requirements for Indians across various age groups. Using the median obligatory nitrogen loss (as per WHO 2007), the group has determined the Estimated Average Requirement (EAR) to be 0.66 g/kg/day and the Recommended Dietary Allowance (RDA) as 0.83 g/kg/day for healthy Indian adults instead of 1g/kg/day (RDA 2010).

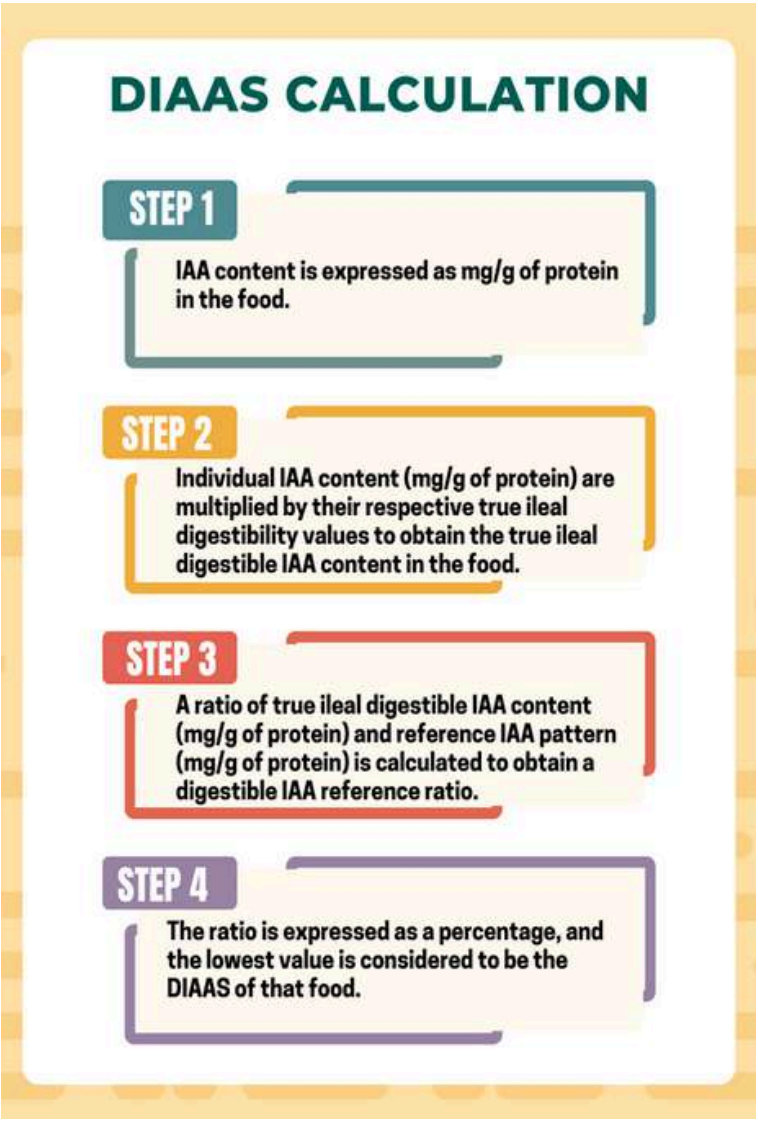


Figure 3: DIAAS calculation of any food protein as per ICMR RDA 2020

To overcome the shortcomings of PDCAAS and to better assess protein quality, FAO recommended replacing the PDCAAS with the new scoring system termed the Digestible Indispensable Amino Acid Score (DIAAS). In DIAAS, the constituent indispensable amino acids (IAA) of a protein source are corrected for its true ileal digestibility and the lowest scoring AA is termed as limiting and this defines the DIAAS score.[17]

The DIAAS calculation of any food protein involves the steps given in Figure 4.

The ICMR also specifies RDA for nutrients based on the requirement of distinct age groups starting right from infant to elderly person. The protein requirement for different age groups in terms of both EAR and RDA can be referred in Table 1 given below.

		Body weight(kg)	EAR(g/kg/d)	RDA(g/kg/d)	EAR (g/d)	RDA (g/d)
Adut Men	Sedentary	65	0.66	0.83	42.9	54
	Moderate					
	Heavy work					
Adut Women	Sedentary	55	0.66	0.83	36.3	45.7
	Moderate					
	Heavy work					
Pregnant Women	2nd Trimester				(+) 7.6	(+) 9.5
	3rd Trimester				(+) 17.6	(+) 22
Lactating Women	0-6 months				(+) 13.6	(+) 16.9
	6-12 months				(+) 10.6	(+) 13.2
Infants	0-6 months	5.8	1.16	1.4	6.7	8.1
	6-12 months	8.5	1.04	1.23	8.8	10.5
Children	1-3 year	12.9	0.79	0.97	10.2	12.5
	4-6 year	18.3	0.7	0.87	12.8	15.9
	7-9 year	25.3	0.75	0.92	19	23.3
Boys	10-12y	34.9	0.75	0.91	26.2	31.8
Girls	10-12y	36.4	0.73	0.9	26.6	32.8
Boys	13-15y	50.5	0.72	0.89	36.4	44.9
Girls	13-15y	49.6	0.7	0.87	34.7	43.2
Boys	16-18y	64.4	0.7	0.86	45.1	55.4
Girls	16-18y	55.7	0.67	0.83	37.3	46.2

Table 1: Protein Requirement for Different Age Groups as per ICMR RDA 2020

The estimated average requirement (EAR) for protein intake in healthy men and women is 0.66 grams per kilogram of body weight per day. To ensure adequate intake for nearly all individuals, the recommended dietary allowance (RDA) is set slightly higher at 0.83 grams per kilogram per day. Additionally, the protein energy (PE) ratio in a balanced diet should ideally range from 10% to 15%, indicating that 10% to 15% of the total daily energy intake should come from protein sources.[18]

Protein Recommendation: RDA 2020	Body weight (kg)	Protein (g/kg/d)	Total daily Requirement (g)
Males	65	0.83	54
Females	55	0.83	46

Table 2: Recommended protein for vegetarians as per ICMR RDA 2020

The national institute also specifies the possible health effects that can occur as a result of protein deficiency in an individual. While severe clinical forms of Protein Energy Malnutrition (PEM), such as kwashiorkor and marasmus, have become increasingly rare, milder protein deficiencies can still lead to significant health issues. In children, these deficiencies often result in stunted growth, muscle wasting, edema (especially in the extremities), brittle or discolored hair, and skin lesions. In adults, protein deficiency is typically marked by noticeable muscle loss, swelling, and thinning of the hair.

Landscape of Protein Products

3.1 Conventional Products

In food industry, conventional products are mostly regulated under the Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011. This framework establishes clear standards for composition, quality, and safety parameters that apply to most established product categories, such as protein bars, biscuits, ready-to-drink (RTD) shakes etc. A few products that are not standardized, or for which no specific standards exist, may also fall under the category of proprietary foods or novel foods.[12]

Some examples of conventional products:



Figure 4: Some examples of conventional products

3.2 Health Supplements including special dietary products

The food items covered under this category are specially prepared or processed for a particular nutritional or dietary purpose, and their unique composition makes them easily identifiable from meals meant for everyday consumption.

Example:

- Health Supplement
- Nutraceutical
- Food for Special Dietary Use
- Food for Special Medical Purpose
- Prebiotic food and Probiotic food

The products falling under these regulations are often prepared in various formats, such as powders, granules, tablets, capsules, liquids, semi-solids, drops, pills, gummies, jellies, chewable formats, mouth-dissolving strips, bars, biscuits, and candies. These are meant for oral consumption in specified amounts and for defined periods, unless particular restrictions apply to certain product categories as per the regulations.[9]

Some examples of health supplement formats:



Figure 5: Examples of Health Supplement Formats

Regulatory Framework

4.1 Global Regulatory Framework

The global food regulatory framework consists of a set of laws, standards, and guidelines established by various countries and international organizations to ensure the safety, quality, and proper labelling of food products. Such global frameworks are required to facilitate international trade and maintain consumer confidence across the globe.

4.1.1 CODEX ALIMENTARIUS

Regulatory Body: The Codex Alimentarius Commission (CAC), established by the FAO and WHO, develops food standards, guidelines, and codes of practice under the Joint FAO/WHO Food Standards Programme. The purpose of this program is to protect consumer health and ensure fair practices in the food trade.[3]

The Codex Alimentarius does provide guidelines and standards for nutrition claims related to protein content in food. Specifically, these claims suggest a food has particular nutritional properties as per the conditions specified, including the protein content.

Nutrition Content Claim:

COMPONENT	CLAIMS	CONDITION (not more than that)
Protein	Source	• 10% of NRV per 100 g (solids) • 5% of NRV per 100 ml (liquids) • or 5% of NRV per 100 kcal (12% of NRV per 1 MJ) • or 10% of NRV per serving.
	High	2 times the values for "source"

Table 3: Condition for making a Claims for Protein as per Codex Alimentarius[3]

These guidelines help harmonize food regulations internationally and ensure that protein content claims on food labels are truthful and not misleading.

The products meant for supplementation are classified into the following categories:

13.3 Dietetic foods intended for special medical purposes.

13.4 Dietetic formulae for slimming purposes and weight reduction.

13.5 Dietetic foods (e.g. supplementary foods for dietary use) excluding products of food categories 13.3, 13.4, 13.6

13.6 Food Supplements [5]

Some conditional requirements as laid down by the Codex Alimentarius is as follows:

Protein Requirement for Formula Foods in Weight Control Diets: The formula food designed for weight control diets must comply with the following protein requirements:

· A minimum of 25% and a maximum of 50% of the energy available from the ready-to-serve food shall come from protein. The total protein provided shall not exceed a minimum daily limit of 125 g.

· Essential amino acids may be added to improve protein quality, but only in amounts necessary for this purpose. Only L-forms of amino acids shall be used, except that DL-methionine is permitted.[7]

Protein Requirements for Formula Foods in very Low Energy Diets for Weight Reduction: The formula food designed for weight reduction diets must comply with the following protein requirements:

· The Recommended Daily Intake of energy shall provide not less than 50 g of protein with a nutritional quality equivalent to a Protein Digestibility Corrected Amino Acid Score (PDCAAS) of 1.

· Essential amino acids may be added to enhance protein quality, but only in the amounts required for this purpose. Only L-forms of amino acids shall be used, except that DL-methionine is permitted.

4.1.2 EUROPEAN UNION

Regulatory Body: European Food Safety Authority.

Definition of Food Supplements as per EFSA:

'Food Supplements' means foodstuffs the purpose of which is to supplement the normal diet and which are concentrated sources of nutrients or other substances with a nutritional or physiological effect.[9]

Permissible dosage formats: Pill, Tablet, Powder, Capsule, Liquid in measured doses.

Labelling Requirement:

· The term "Food Supplement" must be used while selling the products.

· Advertising, presentation, and labelling cannot make claims about curing, treating, or preventing illnesses.

Without prejudice to Directive 2000/13/EC, the labelling shall bear the following details:

i. The names of the categories of nutrients or substances that characteristic the product or an indication of the nature of those nutrients or substances.

ii. The portion of the product is recommended for daily consumption.

iii. Warning not to exceed the stated recommended daily dose.

iv. Statement to the effect that food supplements should not be used as a substitute for a varied diet.

v. Statement to the effect that the products should be stored out of the reach of young children.[11]

Further details about these labelling requirements can be accessed at the following link:

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32002L0046

The products meant for supplementation are classified into the following categories:

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13.4 Dietetic formulae for slimming purposes and weight reduction.

13.5 Dietetic foods (e.g. supplementary foods for dietary use) excluding products of food categories 13.3, 13.4, 13.6

13.6 Food Supplements [5]

Some conditional requirements as laid down by the Codex Alimentarius is as follows:

The EFSA also provides with certain conditions regarding permitted nutrition claims. The specific conditions for source and high in protein claims are provided in Figure 7 given below:

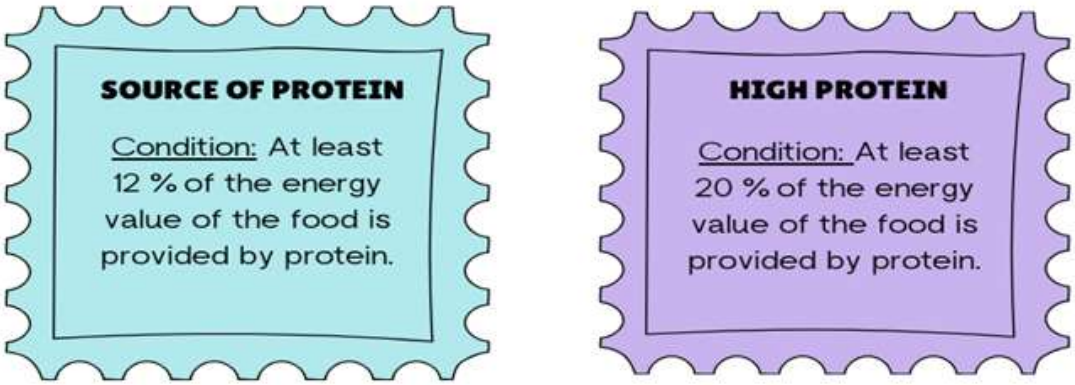


Figure 6: Permitted Nutrition Claims for Protein as per Directorate General Health and Consumer Protection (SCANCO D4) European Commission[8]

Health Claims related to Whey Protein:

Several health claims for whey protein are approved in the EU, highlighting its role in muscle growth, satiety, weight management, and muscle synthesis, with specific conditions of use. Some of these claims can be referred from Figure 3 provided below.[10]

ID	FOOD	PROPOSED WORDING	CONDITIONS OF USE
418	Whey protein	Taken after resistance exercise, whey protein supports muscle growth	20 grams of whey protein after exercise.
419	Whey protein	Combined with exercise and a hypercaloric diet, whey protein supports muscle growth	0.7 grams of whey protein per kg of bodyweight per day.
425	Whey protein	• Whey protein promotes satiety. • Leucine-rich whey protein promotes satiety & weight loss	48 grams of whey protein per serving.
4307	Whey protein isolate	Increases muscle synthesis	Must meet minimum requirements for use of the claim "source of protein"

Figure 7: Some Health Claims for Whey Protein as approved under EFSA Panel on Dietetic Products, Nutrition, and Allergies

For a detailed list of approved health claims related to whey protein, the following consolidated document of Health Claims by the European Commission can be referred. (https://doi.org/10.2903/j.efsa.2010.1818.)

Example of an EU based food supplement:



Figure 8: ISO Real Whey Protein Isolate, Germany



4.1.3 THE UNITED STATES OF AMERICA (USA)

Regulatory Framework: The Dietary Supplement Health and Education Act (DSHEA) of 1994 amended the Federal Food, Drug, and Cosmetic Act, reshaping the FDA's authority over dietary supplements.

Definition: The Dietary Supplement Health and Education Act (DSHEA) of 1994 defines a "dietary ingredient" as a vitamin, mineral, herb or botanical, amino acid, dietary substance that supplements the diet, or a concentrate, extract, or combination of these. A "new dietary ingredient" is one that meets this definition but was not marketed in the U.S. before October 15, 1994.

Ingredients: Dietary supplements contain two types of ingredients:

·Dietary ingredients like vitamins, minerals, and herbs that provide nutrition.

·Other ingredients like fillers, binders, preservatives, sweeteners that help in product formulation.

Delivery Format: Dietary supplements may be found in several formats, such as pills, tablets, capsules, gummies, soft gels, liquids, and powders.

Form of consumption: Dietary supplements are intended for oral consumption only, products that are inhaled or applied topically are not considered supplements.

Medical Advice Before Use: FDA recommends that consumers consult healthcare professionals (doctors, pharmacists) before using dietary supplements, as some may interact with medications or other supplements.

No Pre-Approval by FDA: Under DSHEA, the FDA does not approve dietary supplements for safety or effectiveness before they are marketed.

Labelling Requirements: Ingredients not listed in the "Supplement Facts" panel must appear in the "Other Ingredients" section. This includes sources of ingredients (e.g., rose hips for vitamin C), water, sugar, additives, preservatives, gelatin, starch, and flavors.

Serving Size Limits: There are no legal limits on serving sizes or the amount of dietary ingredients in supplements. This is determined solely by the manufacturer and does not require FDA approval.

Market Monitoring: Since FDA does not approve supplements before sale, it may not be aware of new products entering the market. Consumers seeking more information should contact the manufacturer directly (details must appear on the label).

Advertising Regulation: The Federal Trade Commission (FTC) regulates advertising of dietary supplements. Both FDA and FTC can take action against violations.[25]

Permissible Label Claims: Supplements may carry these three types of claims:

- Health claims (e.g., nutrient–disease risk relationship)
- Structure/function claims (e.g., supports joint health)
- Nutrient content claims (e.g., high in fiber)

Permissible label claims shall meet the requirements set up by the regulatory body. These can be accessed at the following link:

https://www.fda.gov/food/nutrition-food-labeling-and-critical-foods/label-claims-conventional-foods-and-dietary-supplements

Health Claim Authorization

Health claims must meet the criteria under:

- The Nutrition Labeling and Education Act of 1990 (NLEA)
- The Food and Drug Administration Modernization Act of 1997 (FDAMA) [24]

Reporting Adverse Events: Consumers can report side effects or adverse events linked to dietary supplements through the FDA's Safety Reporting Portal.

Restrictions on Disease Claims: It is illegal to market a dietary supplement as a treatment, prevention, or cure for a disease. Such claims classify the product as a drug, subject to drug laws.

Example of a USA based protein supplement:



Figure 9: Whey Protein Supplementation, USA



4.1.3 PHILIPPINES

Regulatory Body: Food and Drug Administration of the Philippines (FDA Philippines)

Definition: Food / Dietary Supplement refers to a processed food product intended to supplement the diet that bears or contains one or more of the following dietary ingredients: vitamins, mineral, amino acid, herb, or other dietary substance of botanical, animal, artificial or natural origin to increase the total daily intake in amounts conforming to the latest Philippine recommended energy and nutrient intakes or internationally agreed minimum daily requirements.

Delivery Format: It is usually in the form of capsules, tablets, liquids, gels, powders or pills.

Ingredients:

- Water-Soluble Vitamins (E.g. Vitamin C and B Vitamins).
- Fat-Soluble Vitamins (Vitamin A, E, D& K)
- Minerals (E.g. calcium, magnesium, and iron).
- Botanical or herbs (E.g. green tea extract, evening primrose oil and malunggay.
- Amino acids (E.g. tryptophan and glutamine).
- Live microbial commonly referred to as "Prebiotic" (E.g. Lactobacillus rhamnosus)

Language Requirements: Labels must be in English and/or Filipino. If another language is used, an English translation is required.

Labelling and Claim Requirements:

- Must display "FOOD/DIETARY SUPPLEMENT"
- Must state "NO APPROVED THERAPEUTIC CLAIMS" on the principal display panel (bold, capital letters, arial font, 14 size)

Permitted Claims: Nutrition Claim, Health Claims, Structure/ Function Claims

Product Registration: All food/dietary supplements, local or imported, must be registered with FDA Philippines before manufacturing, importing, exporting, selling, or advertising.

Prohibited and Restricted Content: Supplements must not contain any active pharmaceutical ingredients (API) (except allowed vitamins and minerals).

According to FDA Philippines, dietary supplements are assessed and classified into the following risk categories:

· Medium Risk- Products that may pose some risk to health if not manufactured or consumed properly, but generally are considered safe under normal use, e.g. Vitamins, Minerals and Amino acids.

· High Risk- Products that can pose significant health risks if misused, contaminated, or incorrectly labelled, e.g. Herbs, Botanicals and Nutritional substances. [21]

RISK LEVEL	PRODUCT TYPE	EXAMPLE
Medium Risk	Food Supplement/Herbal Food/Herbal Dietary Supplements.	Vitamins, Minerals and Amino acids
High Risk	Food Supplement	Herbs and Botanicals and/or products with other nutritional substances and/or combination as food supplement.

Table 4: Classification of Dietary Supplements based on Risk Categories as per FDA Philippines: Manual for Dietary Supplements

Example of a Philippines based Food supplement:



Figure 10: Beneprotein (Food supplement powder), Philippines

4.1.4 SINGAPORE

In Singapore, food and health supplements and related products are regulated by different authorities as explained in the coming section.

Regulatory Authorities

The main food regulatory authority in Singapore is the Singapore Food Agency (SFA). The SFA is responsible for ensuring food safety and security, and it oversees all food-related regulations in Singapore. On the other hand, Health Sciences Authority (HSA) is responsible for regulating health supplements.

Singapore Food Agency (SFA): Oversees food and food-related supplements such as functional foods, protein bars, and ready-to-drink (RTD) shakes.

Health Sciences Authority (HSA): Regulates health supplements.

Permitted dosage formats: Capsule, tablet, soft gels, powder, syrups, and liquids.

Allowed ingredients: Vitamins, minerals, amino acids, fatty acids, Probiotic, enzymes, plant extracts, and bioactives.

HSA prohibits: Products claiming to treat, cure, or prevent diseases.

Language Requirements: Must be in English and any additional languages must be consistent with the English version.

Business Registration Requirement: Company must be locally registered with the Accounting and Corporate Regulatory Authority (ACRA). [16]



Type	Description	Regulatory Body	Claims Allowed
General Health Supplements	Protein powders (e.g. whey, casein, plant based) with basic health claims	HSA	General claims like "supports muscle growth" or "aids recovery"
Sports Nutrition Products	Marketed for athletes with performance- related claims.	HSA	Subject to stricter scrutiny (e.g. "enhance muscle recovery").
Functional Food	Protein bars or RTD shakes with health claims.	SFA	Claims related to nutrition and function must comply with food labelling laws.
Special Purpose Foods	Designed for medical needs (e.g. kidney, disease)	SFA	May require pre-market approval

Table 5: Classification of protein supplements as per Singapore Food Agency [22] and Health Supplement Guideline by Health Science Authority [15]

Example of a Singapore based food supplement:



Figure 11: Whey protein isolate (Food supplement powder), Singapore

4.2 Indian Regulatory Framework

The Food Safety and Standards Authority of India (FSSAI) is the nodal food regulatory body in India. It was established under the Food Safety and Standards Act, 2006 and operates under the administrative control of the Ministry of Health & Family Welfare, Government of India. FSSAI is responsible for laying down science-based standards for articles of food and regulating their manufacture, storage, distribution, sale, and import to ensure the availability of safe and wholesome food.

The statutory body regulates the food products under various regulations and food product categories.

Broadly, food products can be categorised as one of the following:

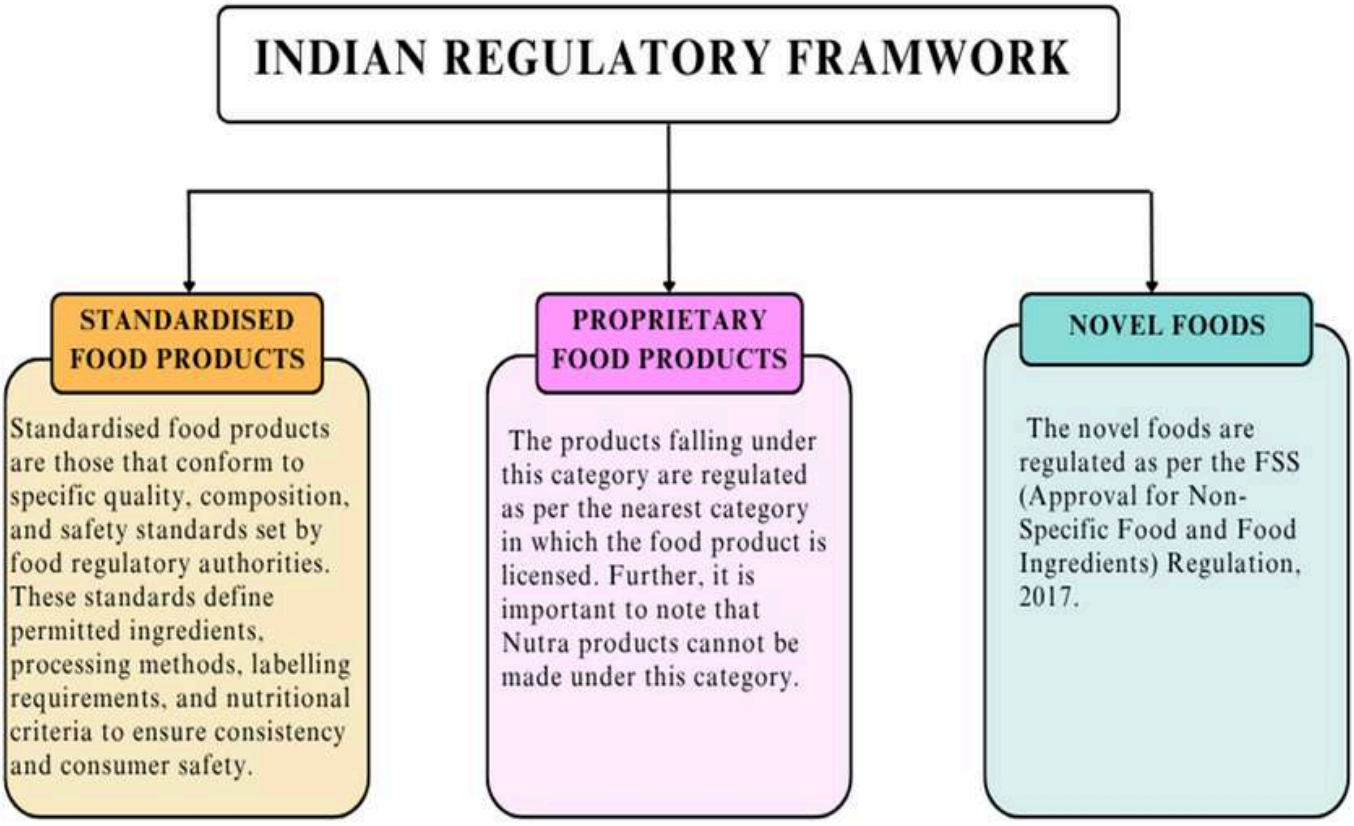


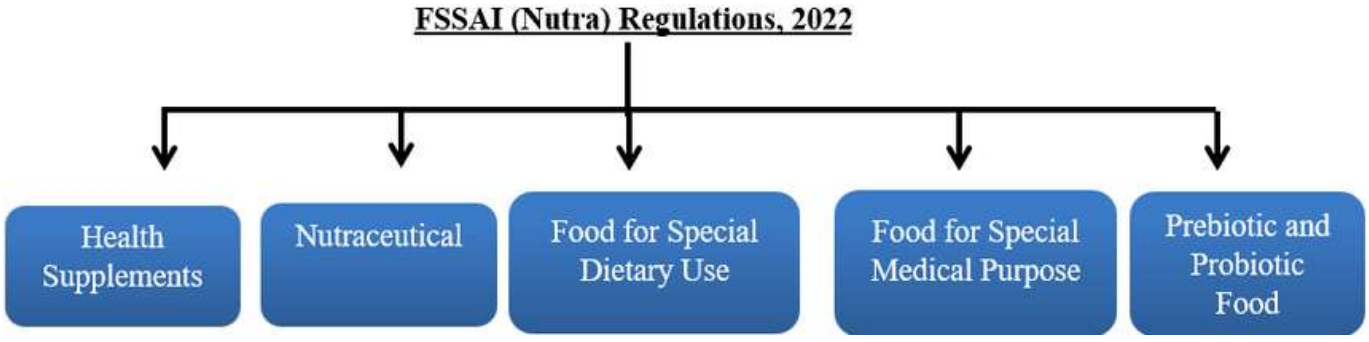
Figure 12: Classification of Food Products as per FSSAI

Standardised Food Products:

Conventional Foods: Conventional foods are usually governed by various set of regulations laid down under FSS Act, 2006. Most of the food products available in the market fall under *FSS (Food Products Standards and Food Additives) Regulations, 2011*. The claims on such products shall be made in accordance with the *FSS (Advertising and Claims) Regulations, 2018*. For example, rich in protein, etc.[12]

Food Supplements: These products may be Health Supplements, Nutraceuticals, Food for Special Dietary Use, Food for Special Medical Purpose, Prebiotic and Probiotic Food. These products are regulated under the *FSS (Health Supplements, Nutraceuticals, Food for Special Dietary Use, Food for Special Medical Purpose, and Prebiotic and Probiotic Food) Regulations, 2022*, commonly referred to as FSS (Nutra) Regulations, 2022.[14]

The Food Supplement products are governed by the *Food Safety and Standards (Health Supplements, Nutraceuticals, Food for Special Dietary Use, Food for Special Medical Purpose, and Prebiotic and Probiotic Food) Regulations, 2022*. These regulations define the scope, permissible ingredients, labelling requirements, and health claims specific to each category, thereby ensuring safety, informed consumer choices.



These product categories covered under the Nutra regulations, 2022, are explained and listed in the table below. 9 These foods have distinct regulatory requirements under the FSS (Nutra) Regulations, 2022 based on the type of product to be manufactured.

A brief summary of these requirements can be found in the Table 6 given below:

Parameter	Health Supplement	Nutraceutical	Foods for Special Dietary Use	Foods for Special Medical Purpose	Prebiotic & Probiotic Food
Definition	HS is a category of foods, which consists of a concentrated source of nutrients (like proteins, minerals, vitamins, amino acids) and/or other ingredients with nutritional or physiological effects, singly or in combination, whose purpose is to supplement the normal diet.	Nutra is a category of foods which consists of extracts, isolates and purified chemical compounds having a physiological benefit and help to maintain health.	FSDU is a category of foods, which are specially processed or formulated to satisfy particular dietary requirements which exist because of a particular physical or physiological condition and/or specific diseases and disorders and which are presented as such. The composition of these foodstuffs must differ significantly from the composition of ordinary foods of comparable nature, if such ordinary foods exist. FSDU which are intended to be used as an adjunct for the management of diseases/disorders only under medical prescription and supervision shall normally be categorized under FSMP.	FSMP is a category of foods for special medical uses, which are specially processed or formulated and presented for the dietary management of patients and may be used only under medical supervision. They are intended for the exclusive or partial feeding of patients with limited or impaired capacity to take, digest, absorb or metabolize ordinary foodstuffs or certain nutrients contained therein, or who have other special medically determined nutrient requirements, whose dietary management cannot be achieved only by modification of the normal diet, by other foods for special dietary uses, or by a combination of the two.	Prebiotic food means food that contains added ingredients which are non-viable food components that confer health benefits to consumer by modulation of gut microbiota. Probiotic food means food with live micro-organisms beneficial to human health, which when ingested in adequate numbers as a single strain or as a combination of cultures, confer one or more specified or demonstrated health benefits in human beings.

Scope	Health supplements are designed to **complement** a person's regular diet and are **not meant** to treat or cure any nutritional deficiencies.	The nutraceuticals are meant to provide a physiological benefit and help maintain good health and not intended to treat or cure any medical condition, disease, or disorder.	This standard applies to all prepackaged foods for special dietary uses, in case of weight management, obesity, diabetes, high blood pressure, pregnant and lactating women, geriatric population, celiac disease, sleep management, food for sportspersons and other health conditions.	This standard applies to the foods specially meant for dietary management of persons with specific medical condition or disease or disorder.	Prebiotics are non-viable food components that confer health benefits by modulating gut microflora while probiotics are food with added viable microorganisms which when consumed in adequate amount confer health benefits.
Nutrient/ Ingredient allowed	Proteins, vitamins, minerals, amino acids, or any other components with nutritional or physiological effects whether used individually or in combination specified in the schedules (excluding Schedule III) by the Food Authority from time to time.	The product may contain molecules, isolates, or extracts listed in Schedule III. Additionally, it may include nutrients and ingredients from other schedules.	Carbohydrates, proteins, vitamins, minerals, amino acids, fats/essential fatty acids, fibre including dietary fibre and other ingredients such as botanicals and their extracts, enzymes, probiotics, prebiotics, and other dietary substances (singly or in combination).	Same as FSDU.	Prebiotic: Schedule IV Probiotic: Schedule IV (plus Prebiotic if needed).
Usage Level (without claim)	The usage level must be at least 15% of the	The usage level must be at least 15% of the	Less than one RDA	Less than one RDA	i. **Prebiotic** Food: Not more than

	Recommended Dietary Allowance (RDA) as specified by ICMR However, if a claim of higher nutrient content is made, the nutrient level shall not be less than 30% of the RDA and in no case exceed one RDA.	Recommended Dietary Allowance (RDA) as specified by ICMR However, if a claim of higher nutrient content is made, the nutrient level shall not be less than 30% of the RDA and in no case exceed one RDA.			40g/day for adults ii. **Probiotic** Food: Minimum viable number of added probiotic organisms in food shall be ≥10^{8} CFU in the recommended serving size per day.
Delivery Format	Powders, Granules, Tablets, Capsules, Liquids, Semi-Solids, Drops, Pills, Gummies, Jelly, Chewable Strips, Bars, Biscuits, and Candies etc. In case the product is in conventional form (e.g., bar, biscuit, candy), the label must clearly differentiate it and not present it as conventional.	Same as HS.	Same as HS	Not allowed in tablets/capsules/strips/gummies unless for tube feeds.	Same as HS

Labelling Requirement	The following are some labelling requirements mentioned here: i. The words "HEALTH SUPPLEMENT/ NUTRACEUTICAL'' as applicable to the concerned category, in capital and bold letters in the immediate proximity of the name or brand name of the product. ii. ii.'Recommended usage level' iii. 'Not to exceed the recommended daily usage' prominently written.	Same as HS.	**Front of Pack** The words **"**FOOD FOR SPECIAL DIETARY USE**"** followed by "Food for....." **Front or Back of Pack** i. A statement that the product is not to be used by pregnant, nursing and lactating women or children under 5 years, adolescents and elderly, except when medically advised by physician or certified dietician or nutrition professional. ii. A warning that the product is not for parenteral use or for oral use only.	**Front of Pack** i. An advisory warning "RECOMMENDED TO BE USED UNDER MEDICAL ADVICE ONLY" ii. The statement "For the dietary management of _____" (the blank to be filled with the specific disease, disorder or medical condition. iii. a statement 'NUTRITIONALLY COMPLETE' if the food is intended to be used as a nutritionally complete food.	**Front or Back of Pack** I. Genus and species including strain designation or culture collection number, in brackets where probiotics are mentioned in the list of ingredients. ii The recommended serving size iii.Proper storage temperature conditions, and time limit for 'Best Use' after opening the container.
Does the product to be taken under medical advice	No, But the products covered under these regulations intended for children of 2 to 5 years of age, shall only be given under medical advice	No, But the products covered under these regulations intended for children of 2 to 5 years of age, shall only be given	Yes	Yes (strictly under medical advice)	No

	by a recognized medical doctor or dietitian or nutritionist.	under medical advice by a recognized medical doctor or dietitian or nutritionist.			
Formulation containing combination vitamins and minerals in tablets, capsules, syrup formats.	Yes	Yes	Yes	Yes	Yes
Can the formulation contain hormones or steroids psychotropic ingredients	No	No	No	No	No

Further, the products shall contain only approved ingredients corresponding to their respective food categories, as specified separately by the Food Authority. A schedule is provided below to list approved ingredients and nutrients.[14]

SCHEDULE TABLE

SCHEDULE	CATEGORY
Schedule I	Nutrients (vitamins, minerals, amino acids and other nutrients)
Schedule II	Plant or botanicals
Schedule III	Molecules/isolates/extracts other than Schedule II
Schedule IV	Prebiotics and Probiotics

Table7: Schedule table as per FSSAI (Nutra) Regulations, 2022

Majority of conventional foods that we find in Indian market are regulated under the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011*. While this regulation provides the compositional requirements, the permissible claims to be made on the label shall be in accordance with the *FSS (Advertising and Claims) Regulations, 2018.*

The conditions for a protein-based claim to be made on a conventional food item shall meet the requirements as given under Table 8.

NUTRIENTS	CLAIM	CONDITIONS
Protein	Source	• 10 percent. of Recommended Dietary Allowance per 100 g for solids. • 5 percent of Recommended Dietary Allowance per 100 ml for liquids. • 5 percent of Recommended Dietary Allowance per 100 kcal. • 10 percent of Recommended Dietary Allowance per serving.
	Rich /High	• 20 percent of Recommended Dietary Allowance per 100 g for solids. • 10 percent of Recommended Dietary Allowance per 100 ml for liquids, or • 10 percent of Recommended Dietary Allowance per 100 kcal. • 20 percentof Recommended Dietary Allowance per serving.

Table 8: Claim Requirement for Protein as per Food Safety and Standards (Advertising and Claims) Regulation, 2018 [13]

4.3 Comparative Analysis between Global and Indian Regulatory Framework for Food Supplements

The comparative analysis outlines differences and similarities between Indian and Global framework in terms of regulating authorities, product classification, ingredients allowed and delivery formats.

Aspect	India (FSSAI)	USA	Philippines	Singapore
Regulating Authority	FSSAI (Food Safety and Standards Authority of India)	US FDA (DSHEA)	Philippines FDA	SFA and HSA
Product Classification	Health Supplements, Nutraceuticals, FSDU, FSMP, Prebiotic and Probiotic Food	Dietary Supplement	Food/Dietary Supplement	Health Supplements, Functional food, Sports Nutrition, Special purpose Foods.
Ingredient Allowed	The products shall contain approved ingredients as applicable to different categories of foods to be specified separately by the Food Authority in the form of Schedules as listed below: Schedule II: Plant or botanicals* C. Schedule III: Molecules/isolates/extracts other than Schedule II D. Schedule IV: Prebiotics and Probiotics and Schedule I: Nutrients (vitamins, minerals, amino acids and other nutrients) Schedule II: Plant or Botanicals Schedule III: Molecules/isolates/extracts other than Schedule II Schedule IV: Prebiotics and Probiotics Some additional ingredients besides these schedules may also be added, as per the provisions laid down under the FSSR.	Dietary ingredient; vitamin, mineral, herbs, amino acid, enzymes.	As per FDA approval list	Specific allowed vitamins, minerals, amino acid, fatty acid, probiotics, enzymes, plant extracts, bioactives.
Delivery Format	FSSAI allows wide range of formats including powder, granules, tablets, capsules, liquid, semi solid, drops, gummies, jelly, bar, biscuit and many products.	Pills, tablets, capsules, gummies, softgels, liquids, and powders	Capsules, tablets, liquids, gels, powders or pills.	Capsule, tablet, softgels, powder, syrups, and liquids.
Language Requirement	English/Hindi	English/Spanish	Labels must be in English and/or Filipino	English
Health Claims	➢ The Products claiming cure, prevention or mitigation of any specific disease, disorder or condition	Health claims must follow NLEA and FDAMA	Nutrition claim, Health Claims Structure/function claims.	Nutrition claim, Health Claims Structure/function claims.

	shall not fall under these regulations. ➢ FBO may make nutritional or health claims or reduction of disease risk claims (DRR) that are listed under FSS (Claims and Advertisements) Regulations, 2018 [FSS (C&A)]. For making any other claims or any exemption to 10(1) of FSS (C&A), prior approval of the Food Authority shall be obtained in accordance with FSS (C&A) Regulations, 2018 by submitting relevant documents and fees.			
Labelling Requirement	❖ The words "HEALTH SUPPLEMENT / NUTRACEUTICAL / FOOD FOR SPECIAL DIETARY USE / FOOD FOR SPECIAL MEDICAL PURPOSE / PREBIOTIC FOOD / PROBIOTIC FOOD" (as applicable) must appear in capital and bold letters near the product name or brand name. ➢ A prominent statement indicating the target consumer group and/or age group if the product is meant for a specific age group.	Ingredients not listed in the "Supplement Facts" panel must appear in the "Other Ingredients" section.	Must display "FOOD/ DIETARY SUPPLEMENT" and must state "NO APPROVED THERAPEUTIC CLAIMS"	➢ Must declare side effects, contraindications and precautions. ➢ Sensitizing substances like benzoic acid, sodium benzoate, tartrazine must be declared.

Table 9: Comparison between Global and Indian Regulatory Framework of Food Supplements

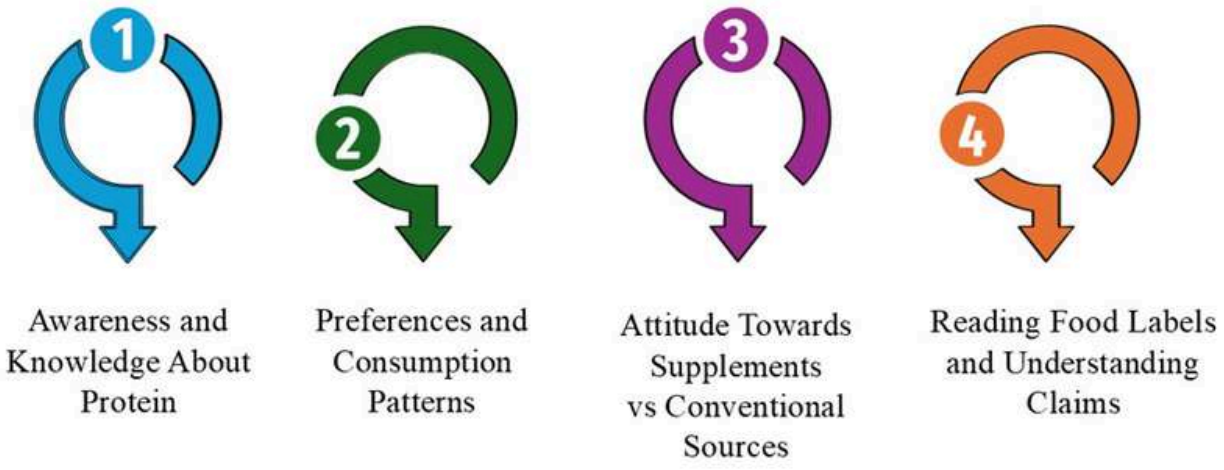
Survey on Consumer Perception

5.1 Objectives and Methodology

The Objectives

This survey is conducted to understand and identify the consumer perception on food products commonly included in the diet or supplemented to meet the daily protein consumption of an individual and further facilitate evidence-based discussions by focussing on data, statistics and objective information.

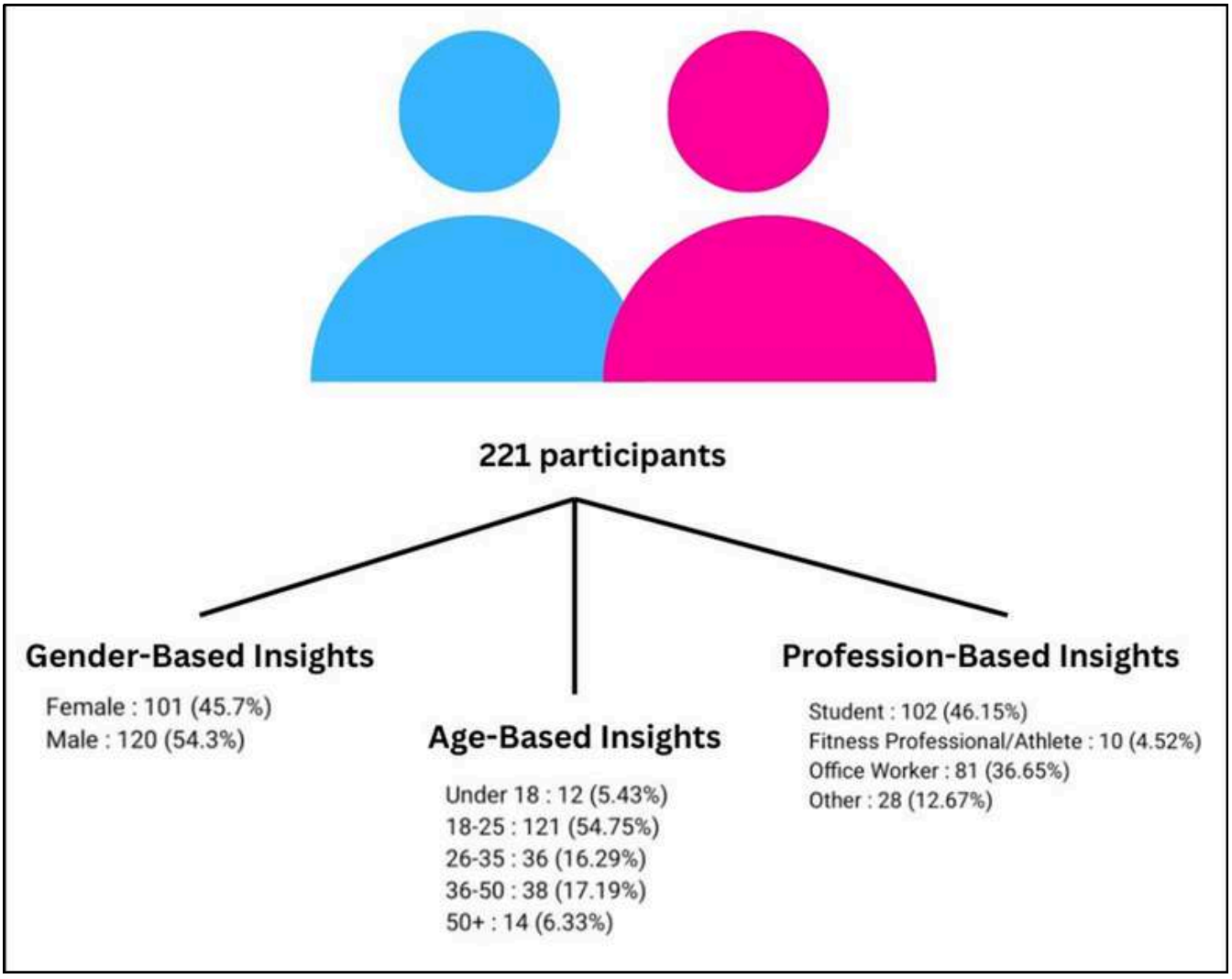
The survey is designed to learn the gender-based, age-based and profession-based insights focussing on four factors as:



This report will be beneficial to understand the consumer perspective on both conventional and food supplement products available in the market. Their preferences will directly relate to their own well-being, awareness and purchase behaviour of such products in India.

The Methodology

The survey was conducted with 221 active participants in the age groups ranging from under 18 to elderly people constituting the 50+ population. Distinct age groups come with different professions, and hence the dietary requirements to meet their daily nutrient needs.



A structured online survey was developed and disseminated among wider audience using Google Forms to collect the primary data. The questionnaire comprised multiple questions, specifically tailored to elicit insights on consumption patterns, awareness, and purchasing behaviour related to foods used for protein supplementation. These can be accessed as Annexure 1 provided in this report. The survey link was shared within professional networks and students via social media handles. The responses were collected anonymously as the survey did not ask for identification of the individual. Further, participation in this survey was voluntary and open to distinct age groups.

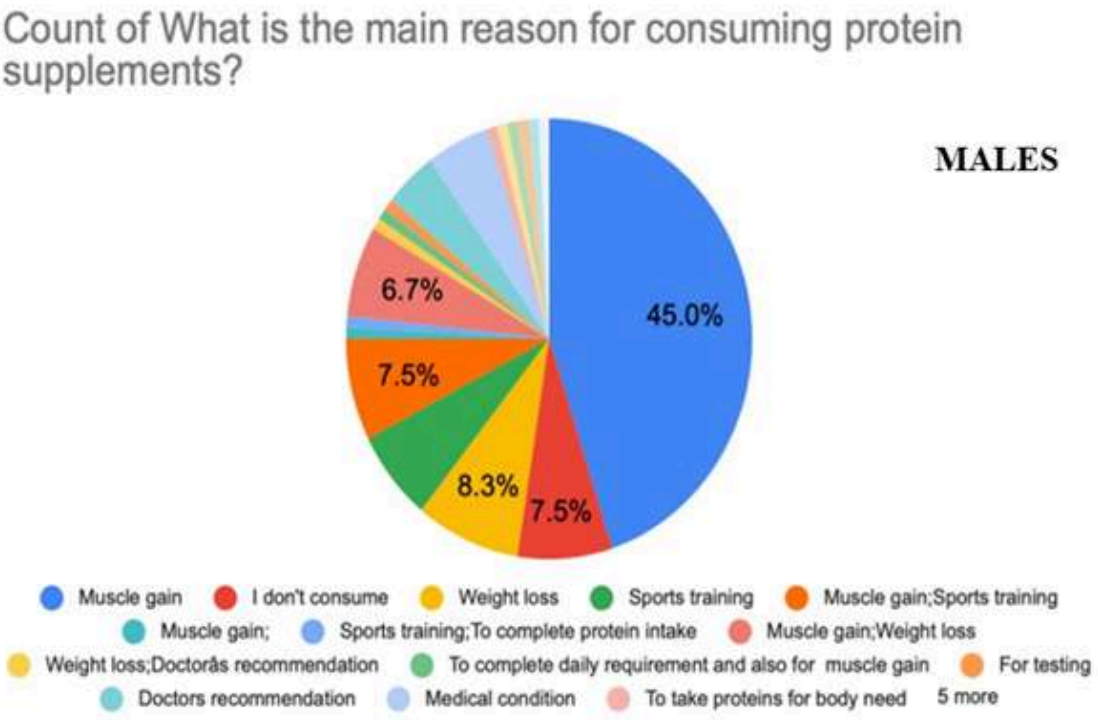
In order to fulfil the objectives of the survey, a detailed analysis was done based on gender, age and profession of an individual. The dietary requirements differ with these parameters and hence it is important to identify the independent perceptions of the individual. For example, Individuals in physically demanding professions often require higher protein intake for muscle repair and energy, while those in sedentary jobs may have lower requirements.

5.2 Detailed Insights on Survey

5.2.1 Awareness and Knowledge About Protein

Gender-Based Insights

The survey indicates a noticeable difference in awareness levels between males and females regarding protein consumption. Males generally exhibit higher awareness of protein's role in muscle gain, weight loss, and sports training where more than 45% of male population believes muscle gain as the main reason of consuming foods for protein supplementation. This could be attributed to their greater engagement with fitness-related content, gym culture, and sports nutrition.

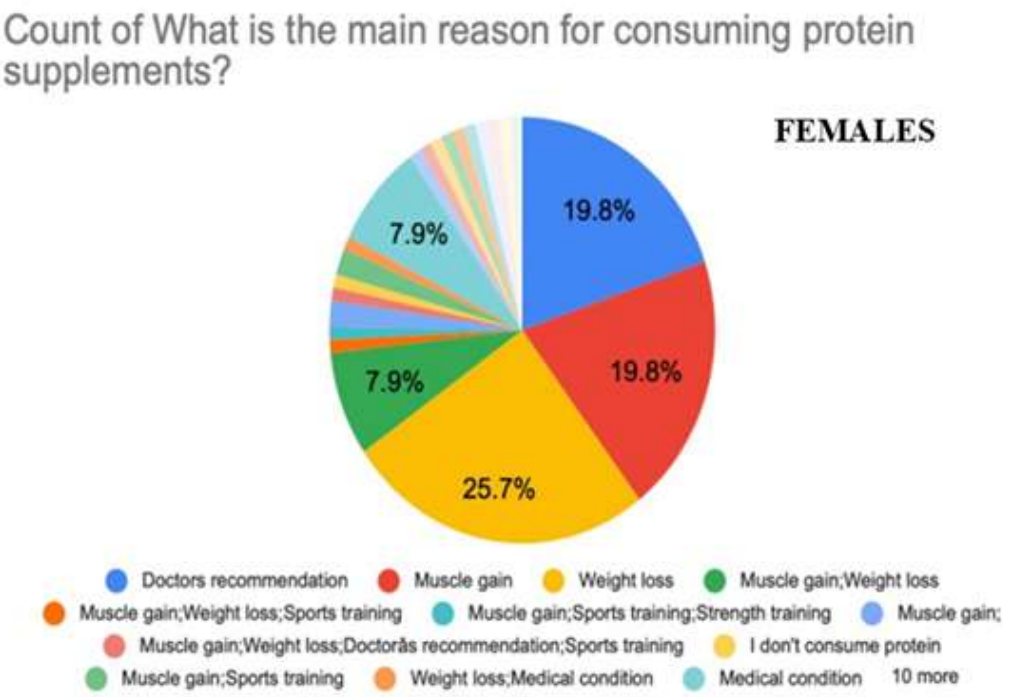


On the other hand, females tend to associate protein consumption more with general well-being including any medical recommendations for protein intake and weight loss rather than muscle gain. The results reported that approximately 26% of females consider weight loss as the prime factor for the consumption of protein supplements.



“Majority of males associate protein with muscle gain, while females link it to well-being and weight loss.”





Further, their also exists some section of population that interprets protein consumption as an important part of diet because of multiple factors including sports training, and strength training in females. It is believed that their knowledge is often influenced by dietary trends such as plant-based eating, weight management, and holistic health. Additionally, females show more scepticism towards protein supplements, as 54.5% of females rarely consume protein supplements even after being aware of the multifaceted role of such products on human health.

Age-Based Insights

Awareness of protein varies significantly across age groups:

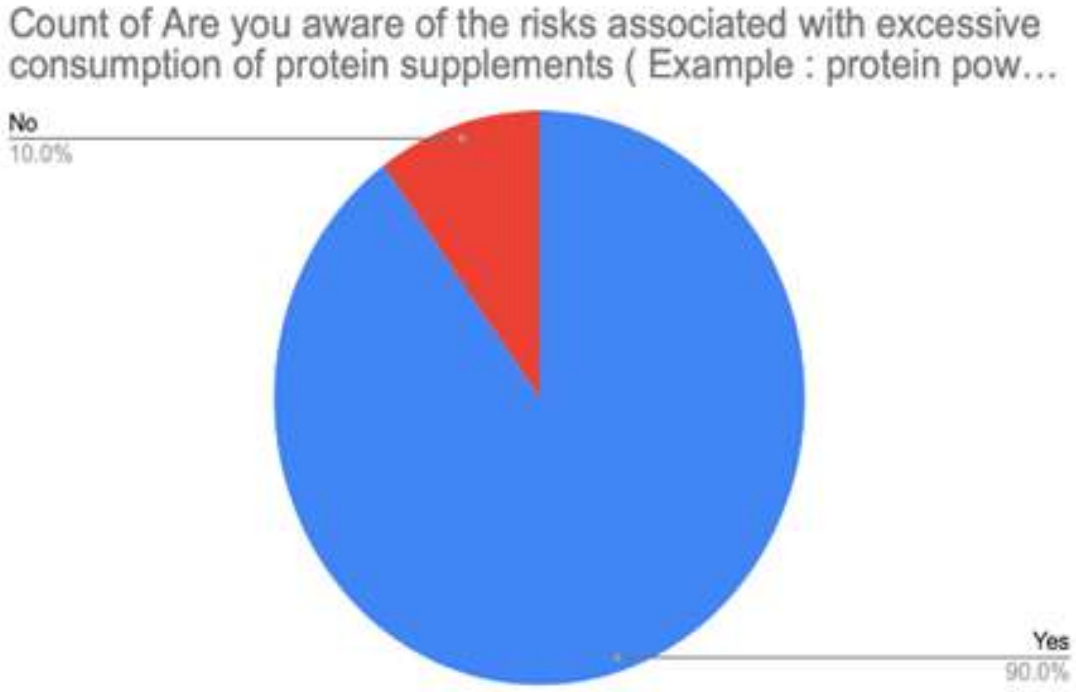
- Younger individuals (Under 18, 18-25) demonstrate moderate awareness, largely driven by social media, fitness influencers, and gym culture. It is surprising to note that 23.7% of people falling in the under 18 age group believes that medical condition could be the main reason for consuming such products, followed by 21% emphasizing on muscle gain. On the other hand, when it comes to people in 18-25 age group, they often associate protein with muscle gain and weight management rather than overall health.
- Middle-aged groups (26-35, 36-50) exhibit a more balanced awareness, recognizing protein's role in metabolism, muscle maintenance, weight management and doctor’s recommendation. It could also be observed that 38.9% of the population within the former age group of 26-35 believed that muscle gain is the main reason for consumption of protein supplements, however as the age progresses, 23.7% of the people in latter age group believed medical condition followed by muscle gain as the main reasons. This shows that the latter group is more likely to seek expert medical advice and make dietary choices accordingly.

- Older individuals (50+) tend to have limited awareness, often associating protein consumption as a requirement based on doctor's recommendation (28.6%) or medical condition (21.4%) rather than a daily dietary necessity. Their knowledge is often based on traditional dietary habits rather than scientific evidence published over the period of time.

Profession-Based Insights

Profession plays a crucial role in shaping awareness levels.

- Fitness professionals and athletes have the highest awareness, as protein is integral to their performance, recovery, and muscle maintenance. They are well-versed in different protein sources, supplementation, and therefore are also aware of the risks associated with excessive consumption of such products. For instance, it could be seen that 90% (pie-chart below) of people belonging to such professions are already aware about such risks or impact on human health.



- When it comes to students and office professionals, they recognize the importance of protein however they may not actively prioritize it in their diet as majority of the population falling under these professions rarely consume products for protein supplementation.

Profession Drives Awareness and Usage

- Fitness professionals show the highest awareness (90%) and informed use of protein.
- Those in physically demanding jobs may have better exposure and awareness regarding these foods, while sedentary workers may overlook their protein intake.



- Other professionals exhibit mixed levels of awareness including the risks associated with consumption of products for protein supplementation. This could be attributed to the lifestyle and dietary habits of an individual. Those in physically demanding jobs may have better exposure and awareness regarding these foods, while sedentary workers may overlook their protein intake.

5.2.2 Preferences and Consumption Patterns

The survey reveals distinct differences in protein consumption patterns among the varied population. The following section will discover the results based on the product format, preferable protein sources and probable reasons that could be attributed to these choices as a part of analysis. Further, it is important to understand the consumption pattern in terms of relying on the protein supplements as a complete meal in the daily diet of an individual.

Gender-Based Insights

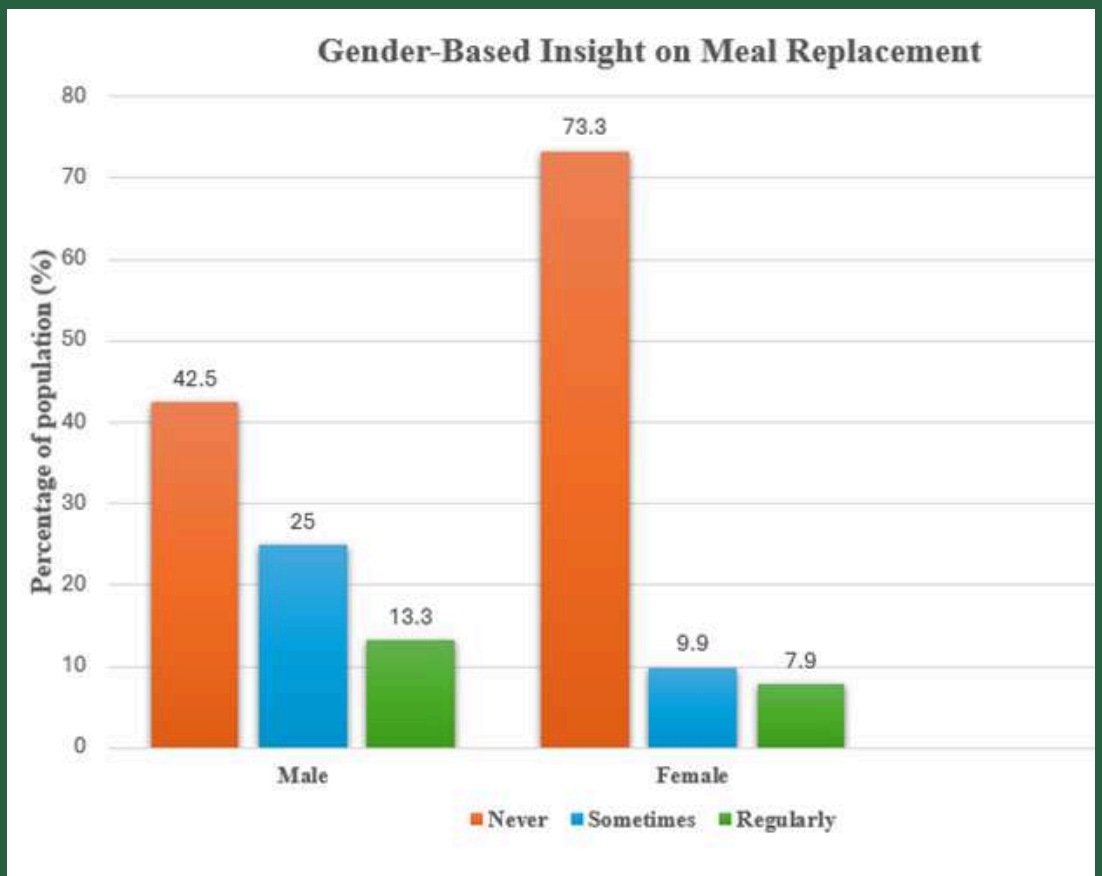
- Males tend to prefer protein supplements in various formats wherein 19.6% of the population solely opt for protein powder as the preferred format. Based on the data received, many people are quite adaptable to different product formats. For instance, 14.3% of the males prefer both protein powder and ready-to-drink shakes for consumption. This was followed by a small segment of male population that also prefers protein bars for supplementation. It is believed that this preference is largely driven by their fitness goals and convenience.

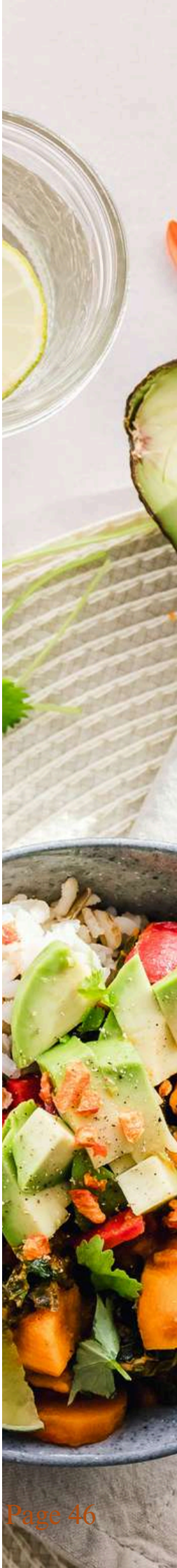
  Further, when it comes to the inclusion of conventional dietary sources in the daily diet of an individual, it could be reported that 40.8% of males include protein-rich foods in their regular meals to meet their daily needs. While 42% of males never consume protein supplements as a replacement of their diet, there does exist 25% of the male population that sometimes replaces their regular meal (breakfast or lunch or dinner) with a protein supplement.



- Females, on the other hand, gave mixed preferences in terms of preferred product formats for supplementation. Similar to male population, 15.4% of females chose protein powders as the format used for consumption of protein supplements. It could also be reported that 12.3% of females were satisfied with any of the available formats including protein powder, bar, ready-to-drink shakes, and high protein cookies or snacks. Based on the questionnaire, tablet format did not get much attention among females when it comes to commonly used formats in daily life for protein supplementation.

The data also reported that 35.6% females included protein-rich products in their regular diet atleast 3 - 5 times a week followed by 29% that only included 1-2 times a week. Consequently, a very significant proportion i.e. approximately 73% of females never replace their regular meal (breakfast or lunch or dinner) with a protein supplement. Their preference may be influenced by health-conscious choices, concerns about artificial additives, and dietary trends such as veganism and clean eating.

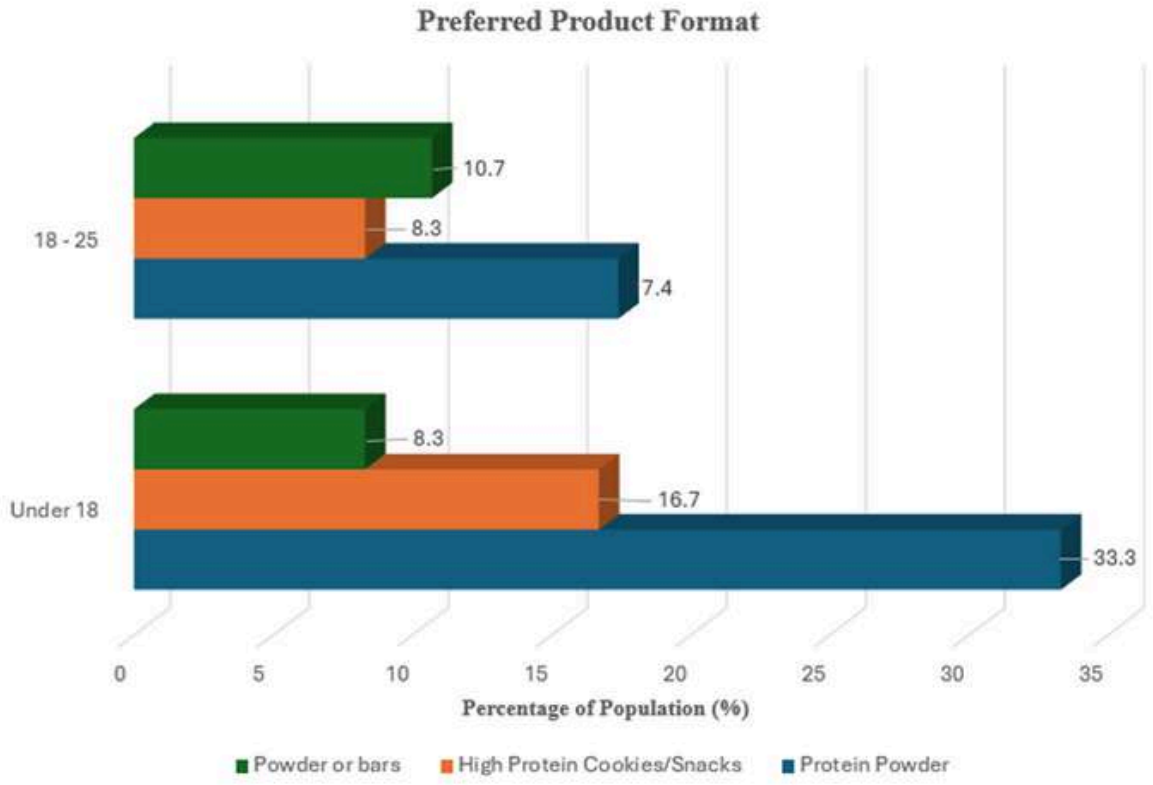




Age-Based Insights

Consumption patterns vary significantly across age groups.

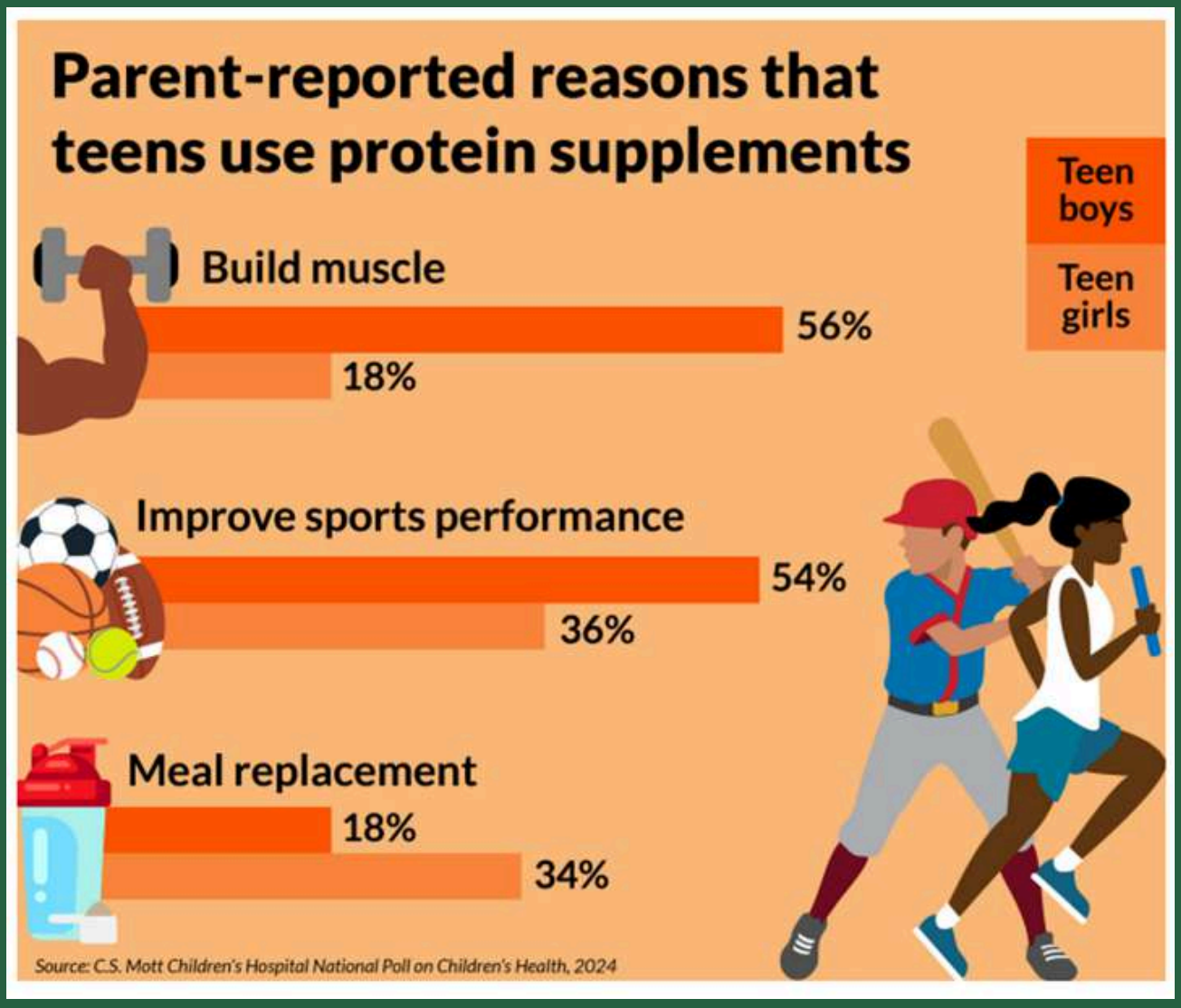
- Younger individuals (Under 18, 18-25) prefer ready-to-consume protein products due to convenience and fitness trends. Based on the data obtained, people in under 18 age group exhibited a higher preference for protein powders (33.3%) and high protein cookies/ snacks (16.7%) over other type of product formats. When it comes to the population between 18-25 age groups, 17.4% people usually opt for protein powders and 10.7% people usually consumed either powder or bar formats.



The former age group is quite aware of the protein-rich foods as 41.7% of these people include such foods in their regular meals. However, it remains unknown if such foods are also supplemented or complemented by food supplements by people in this age group. As far as the latter age group is concerned, approximately 34% of people include protein-rich foods in their regular meals which is followed by approximately 21% people who include such foods about 3-5 times a week. This indicates a greater acknowledgement of the significance regarding protein consumption in the under 18 age group.

However, despite the inclusion of protein-rich foods and awareness regarding adequate protein intake for muscle growth and healthy bone development, the extent of reliance on protein supplements as a replacement of diet could result in imbalanced nutrition. It is observed that 33.3% of male population under 18 or teenage regularly replace their meals with a supplement product whereas on the other hand, approximately 67% of females under 18 age group never replace their diet with such products and only 33% females sometimes, not regularly, replace their meal with protein supplements.

A study was conducted with US population. The US based report as a part of the Mott Poll web-based surveys on 'Teens and Protein' (2024) mentioned that 18% of teen boys use protein supplements as a meal replacement, whereas 34% of teen girls replace their diet with protein supplements. This could be attributed to the fact that teen boys are more focussed on muscle building rather than meal replacement. At the same time, teen girls opt for such replacements when they are too busy to eat and 26% believe that supplements are important to eat a balanced diet.



Source: Mott Poll Report on 'Teens and Protein', National Poll on Children's Health, Volume 46, Issue 2 (October 21, 2024)



Our survey observed that 25% of under 18 population actually replace their regular meal with a protein supplement. On the other hand, only 9.1% of the people between 18-25 age group replaces their diet whereas 59.5% of people under this age group never replace their regular meal (breakfast or lunch or dinner) with a protein supplement.

- Middle-aged groups (26-35, 36-50) focus on balanced meals as both these age groups tend to include protein-rich foods atleast 3-5 times a week in their regular meals. Therefore, as the age progresses, approximately 58% of people admit that they never replace their regular meals with a protein supplement product.

This shows that people in this wide age group are more likely to incorporate protein into their daily diet rather than majorly relying on food supplements. When consuming products for protein supplementation, majority of the population preferred protein powders as the suitable format of consumption. This was followed by high-protein cookies and snacks available to increase the protein intake of an individual.

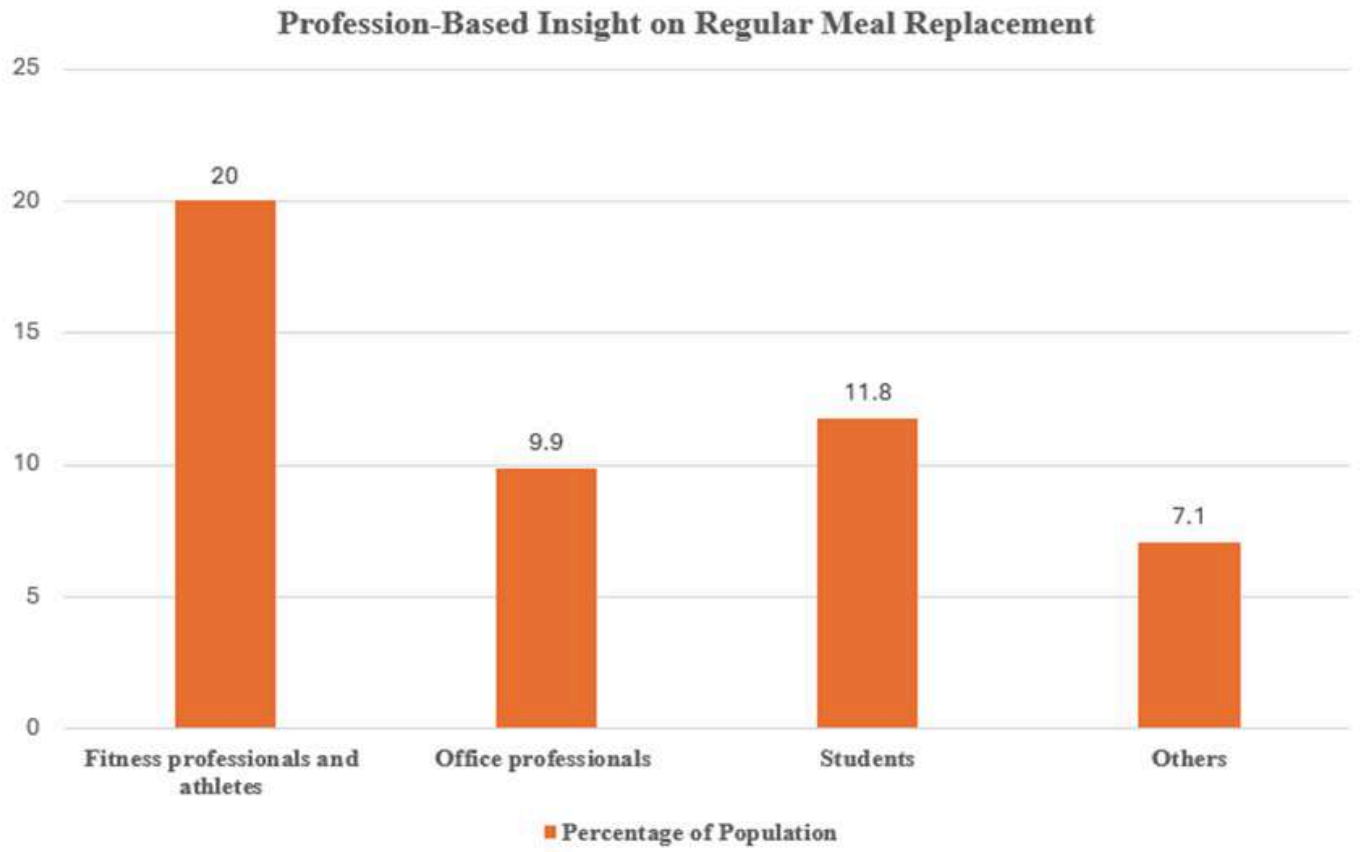
Older individuals (50+) rarely opt for deliberate addition of protein-rich foods in their regular meals. However, there also exists a segment of population where approximately 29% of people in this age group does give importance to protein-rich foods and make them a part of their daily diet. Their consumption is often based on cultural dietary habits including traditional protein sources, that justifies that 93% of people in this age group never replace their regular meal (breakfast or lunch or dinner) with a protein supplement product.

Profession-Based Insights

Profession influences protein consumption patterns significantly.

- Fitness professionals and athletes consume protein supplements regularly, often integrating them into their meal plans for optimal performance. When comparing distinct product formats for consumption, protein powders were found to be the most acceptable format among fitness professionals and athletes. Besides consuming food supplements, 70% of people in these professions include protein-rich foods as a part of their regular meal. It is also reported that 40% of people in this profession never replace their regular meal with a protein supplement.

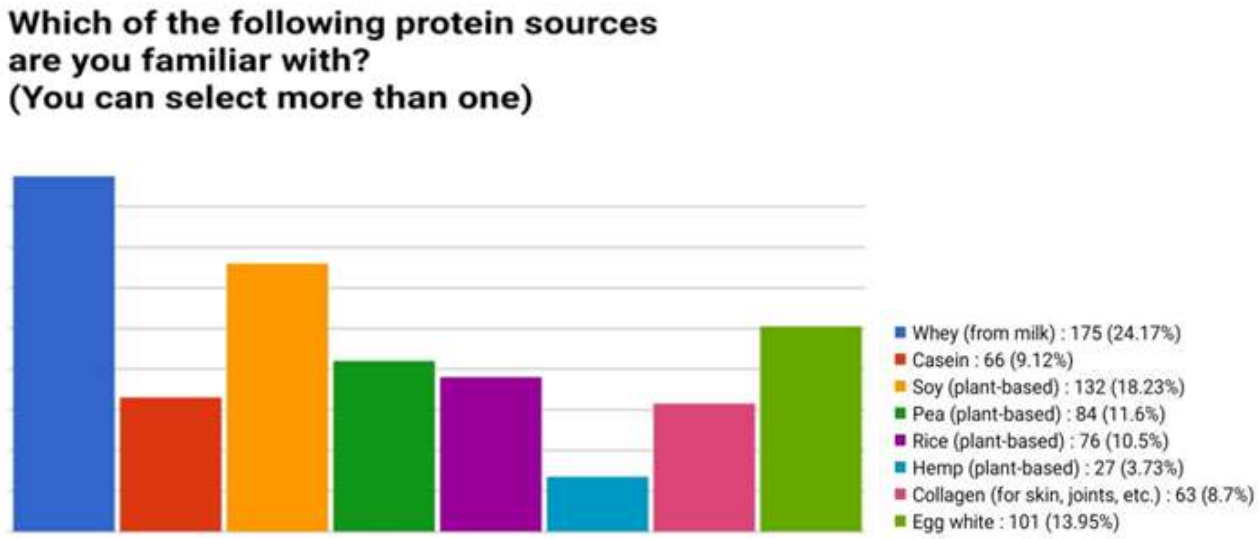
- Office professionals and students prefer convenient protein options like protein powders but may not consume them consistently due to busy schedules and affordability concerns. The data reported a similar awareness among both professions as a comparable proportion of students and office workers included protein-rich foods in their regular meals. Further, around 55% of the population in each case never replace their diet and consume protein supplements solely. This shows that active individuals in this age group generally exhibit greater awareness of their dietary needs due to the direct impact of food on their physical performance, growth and recovery.
- Other professionals show varied consumption patterns based on dietary habits, with some prioritizing protein intake while others neglect it. Similar to others, protein powders were the most acceptable formats for consumption of protein in this group. When it comes to balanced consumption of protein-rich products, 68% of people never replaced a regular meal with any protein supplement products.



5.2.3 Attitude Towards Supplements vs Conventional Sources

This section will cover insights based on the familiar protein sources, and distinct perception relating to both conventional sources and food supplements for protein intake in an individual.

On observing the trend for overall population, it could be seen that whey was found to be the most familiar protein source to all individuals irrespective of their age or profession. The below mentioned graph justifies that 175 out of 221 provided this response, followed by soy and egg white in the order.



Gender-Based Insights

Attitude towards protein supplements differ between males and females.

- Males view protein-rich products, including both conventional and supplement products as effective for muscle gain and recovery. They are less concerned about other factors and also show significant awareness regarding the animal and plant-based protein sources. When asked about their preferred source of protein, 26% of males preferred plant based sources (lentils, soy, nuts, seeds, etc.), followed by 23% opting animal based sources (egg, meat, dairy) and 16% population acceptable to either of the two sources. This section of the population did not choose packaged health supplements and nutraceutical products as their preference in meeting the daily dietary needs of the body. Further, on asking the specific sources, it was also reported that 26% of males were aware about whey (from milk) as an important protein source. The rest of the population provided mixed responses that exhibited awareness regarding plant-based sources like soy, pea, rice, hemp, etc. among this section.



- Females, however, are more sceptical, preferring conventional sources due to concerns about overall health implications. They are more likely to research ingredients and opt for protein supplements for weight management and well-being rather than focussing on muscle building. Similar to male population, the preferred source of protein for approximately 36% females was plant based sources (lentils, soy, nuts, seeds, etc.), followed by 17% population that was fine with either of the two sources.

  Regarding perception on the availability of protein supplements in the market, 72.3% of females believed that such products shall be prescribed by doctors or certified health professionals only. Females tend to have a fear of side effects that these products may cause. Their thought behind prescription for such products could be attributed to their health-conscious choices and the fear as identified in majority of the population.

Age-Based Insights

Age plays a crucial role in shaping attitude towards protein supplementation.

- Younger individuals (Under 18, 18-25): Among the Under 18 population, there's a strong inclination towards conventional sources of protein including both plant-based and animal-based sources like lentils, soy, nuts, seeds, milk, pulses, and eggs. Around 75% of this group prefers food-based protein sources over supplements. Only a minor fraction, approximately 15% opt for packaged health supplements. Further, over 50% of respondents in this group believe that protein supplements should only be taken when prescribed by a doctor, indicating a cautious approach rooted in guidance and awareness.

  The age group (18-25) showed a very slight increase in supplement usage wherein people incorporated such products into their routines, often driven by fitness goals, gym culture, or social influence. However, there exists around 58% of people that still rely on natural sources, showing a balanced mindset. Interestingly, a significant 70% believe in the need for professional guidance before starting supplementation, indicating a growing but still conscious acceptance of supplemental products.

- Middle-aged groups (26-35, 36-50) prefer a mix of supplements and natural sources, balancing convenience with health-conscious choices.

  Individuals aged 26–35 show a similar preference for supplement-based protein intake as the previous age group, with nearly 50% indicating regular use of conventional protein sources including soy, lentils, nuts, seeds, milk, eggs and other dairy products. This trend is often influenced by lifestyle, convenience, and a strong focus on body image or fitness goals. Additionally, a parallel trend also emerged that around 69.4% believe supplements should be taken only after medical advice, suggesting responsible usage despite growing adoption.

  In this age bracket, there's a reversion to conventional sources, with around 42% preferring plant-based food protein sources like lentils, soy, nuts and seeds. Supplement adoption remains moderate, with only 20-25% using them. Interestingly, a similar proportion i.e. 68.4% of people in this group stated that supplements should be prescribed only by certified professionals, reflecting a more health-conscious and risk-averse mindset.

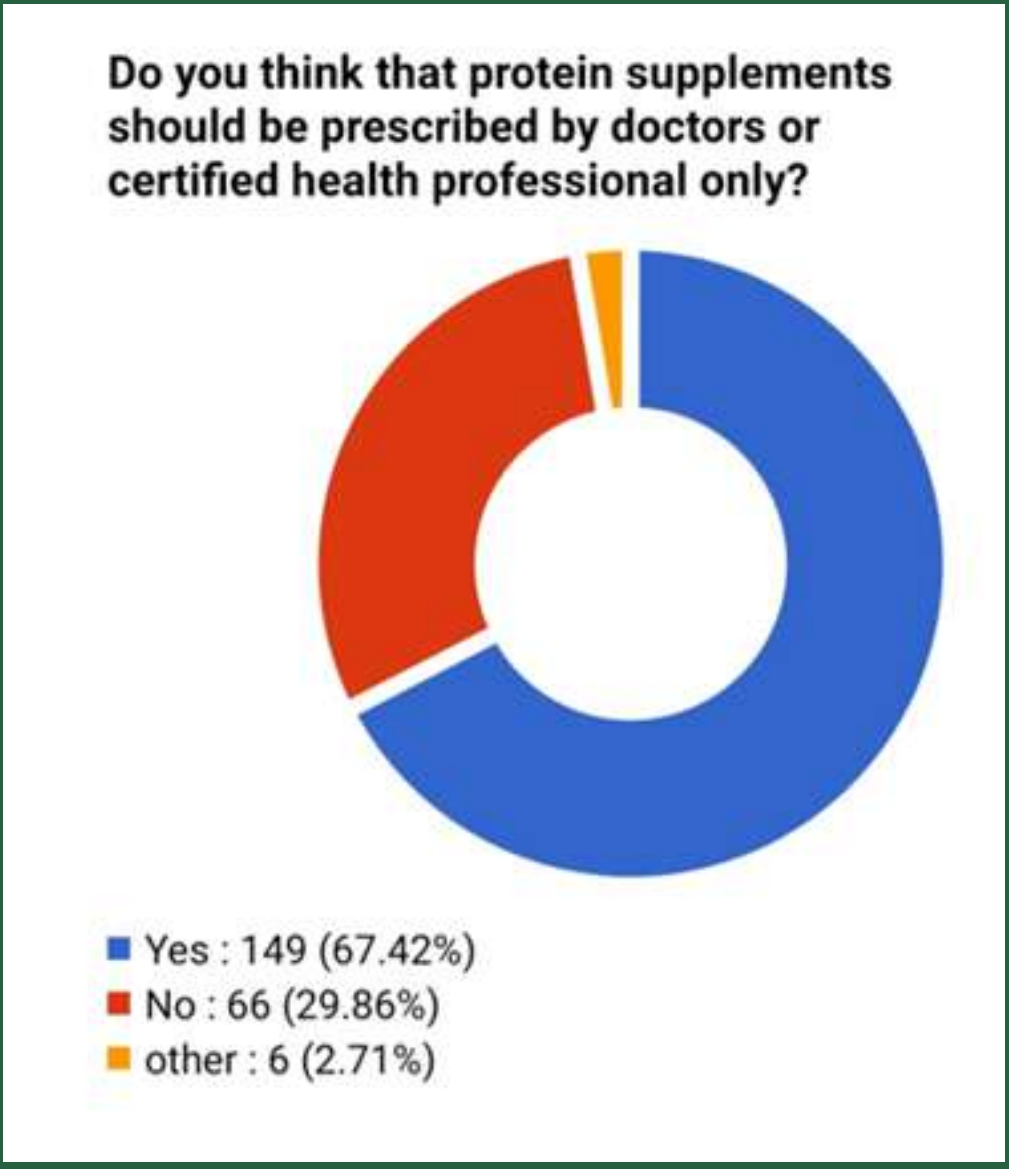
- Older individuals (50+) largely gave mixed responses based on both types of sources. It could be interpreted that while the conventional sources were favourable to them, this age group was also adaptable to the packaged health supplements owing to their increased nutrient requirements to maintain overall health and well-being with increasing age. However, 50% of people in this group do believe that protein supplements shall be prescribed by a certified health professional only.

Profession-Based Insights

Profession significantly impacts attitudes toward protein supplementation.

- Fitness professionals and athletes strongly believe in medical prescription with 80% of people falling in this age group believes that food supplements shall be prescribed by certified health professionals only. They do favour supplements for performance enhancement, recovery, and muscle maintenance; however, they are also quite aware and inclusive of the plant-based protein sources.
- Office professionals and students have mixed attitudes, often influenced by affordability and accessibility. People falling under this category are quite aware and preferable of whey as protein source, followed by soy highlighting their choice for plant-based protein. It could be observed from the data that majority of the population preferred plant-based protein and animal-based protein over the packaged health supplements and other products like bars, etc. However, majority of them also believe supplements should be taken only under medical supervision, indicating a highly conservative and health-dependent approach.

“While gender-based, age-based and profession-based insights gave an idea of distinct preferences, the overall trend showed that 149 out of 221 participants believed in medical supervision for purchasing protein supplement products.”



5.2.4 Reading Food Labels and Understanding Claims

This section will explore the consumer practices in terms of being aware of the regulatory framework, reading food labels, understanding of health claims mentioned on the packs and purchase behaviour.

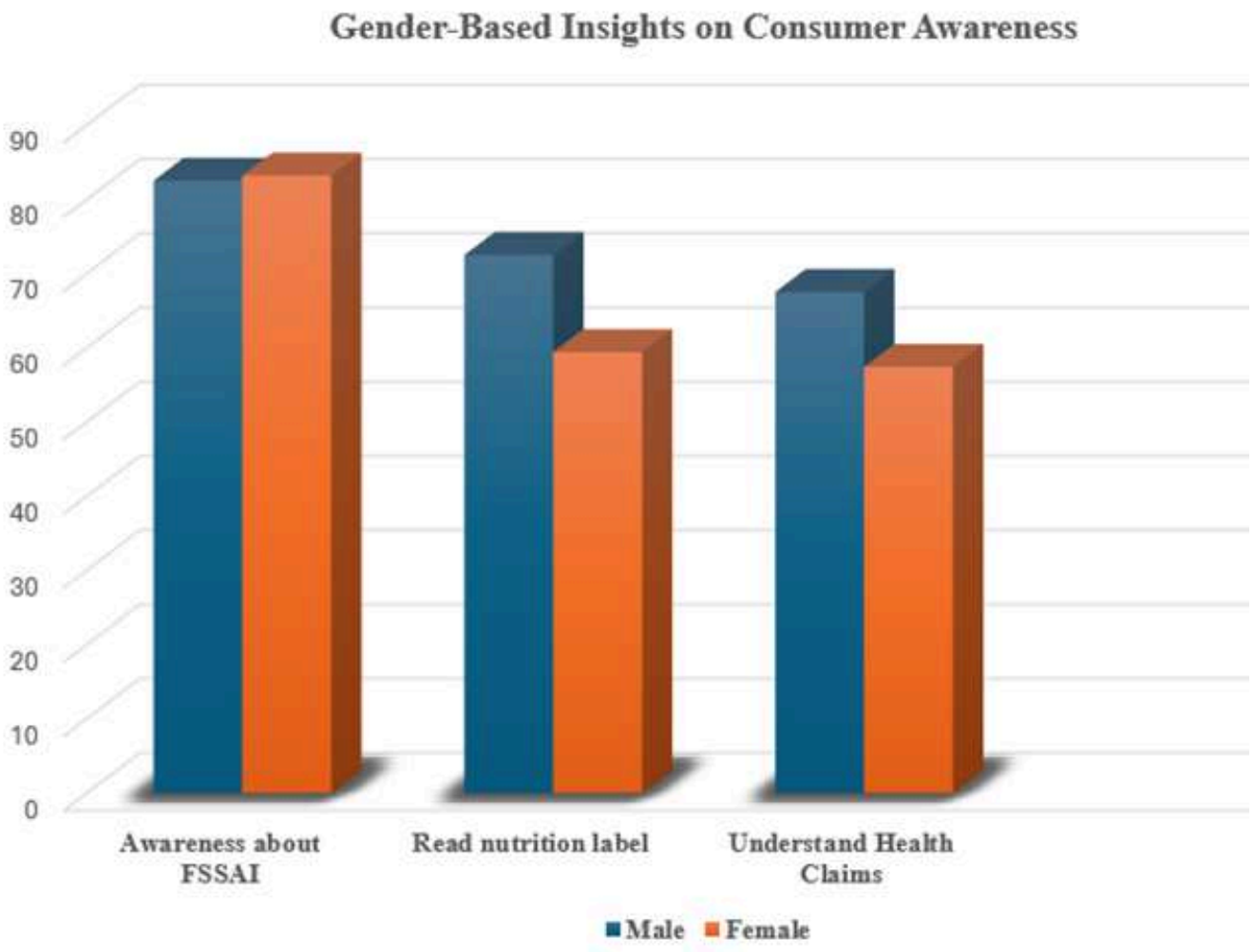
Gender-Based Insights

The survey highlights differences in consumer practices between males and females.

- Males are more likely to purchase the supplement products from the e-commerce website including Amazon, Flipkart, etc. This is followed by around 18% of male population that bought such products from their gym trainers. The given trend rightly shows the prevalence of male population towards the gym culture and fitness goals as compared to female population.

  It is pertinent to identify the awareness in terms of the national food regulator in India. When asked about the regulatory body, approximately 82% of the male population was aware of the FSSAI as the regulatory body for food products in India. However, there still existed 12% of people who are unaware of such developments. The increased awareness about the regulator rightly direct towards the 73% population that reads nutrition label before purchasing any product.

  It was also found that males usually check Ingredients list, FSSAI logo, license number, brand name and health claims before any other information given on the package. The majority of the population always follow the recommended dosage of the supplement product mentioned on the label. The data also reported that 68% of the males understood health claims mentioned on the pack. On the other hand, 26% of males struggle in understanding health claims and are only partially aware of them. On observing the areas of concern, costing of the product and probable side effects on consumption of such products were the major responses received.



- Females also tend to purchase supplement products from the e-commerce website including Amazon, Flipkart, etc. Unlike males, 33% of females trust pharmacy stores for buying these products, followed by gym trainer. Their approach is more holistic, considering factors beyond just protein content. When asked about the national regulator, a significant proportion i.e. 83% of females are aware about the role of FSSAI.

  As compared to the male population, females somehow need to be more aware of the labels as 31% of females read food labels only sometimes and not always. On the other hand, 60% of females always read the nutrition label focusing on ingredients, brand name and online reviews for purchasing any product for supplementation. This justifies the 57% of female population that understand health claims, however 26% of females are able to understand these claims only partially. The data also reported that while 26% of females have no concern about these products, 11% of the population is worried about the misleading claims provided on the food label.

Age-Based Insights

Label-reading habits vary across age groups:

- Younger individuals (Under 18, 18-25): The Under 18 population seems more diverse with respect to the platforms for purchasing protein supplements. An equal proportion of people showed acceptability for e-commerce platforms, gym trainer, pharmacy and official brand websites. 58% of people are aware of FSSAI, however, only 42% of people in this group read nutrition label before purchase.

  75% of the people in latter age group follow the recommended dosage and duration as provided on the label of food supplements. This could be attributed to the fact that this section of population is quite aware of the health impacts that may occur as a result of the excessive consumption of these products. Therefore, around 84% of people are aware of the regulator, FSSAI and 79% people in this group actually read the nutrition label before purchasing the product. However, when it comes to claims on the food product labels, 27% of population in this group only partially understands the health claims mentioned on the pack. When asked about the concerns, potential side effects and costing of the supplement products were the major responses from both age groups followed by misleading claims on the food labels.



- Middle-aged groups (26-35, 36-50) are more conscious of nutritional values and ingredients, actively reading labels to make informed choices. They are aware of the FSSAI and approximately 72% of middle-aged group read nutrition labels before purchasing any product.

While majority of the people in this age group understand health claims, there exists 24% of the people in this category who are able to interpret these claims only partially. For this group, as the age progressed, a shift in platform for purchasing these products was observed. Higher trust could be established on pharmacy stores as compared to the gym trainers in the latter group.

- Older individuals (50+) surprisingly showed greater awareness of the regulatory body in India as 71% of the population is aware about the role of FSSAI. On the other hand, they rarely check labels, relying on traditional dietary knowledge rather than scientific information. This could be attributed to the result wherein 43% of people in this group never reads nutrition label before purchasing products for supplementation. This group exhibited concerns regarding lack of stringent regulation and potential side effects of these products on human health.

Profession-Based Insights

Profession influences label-reading habits significantly.

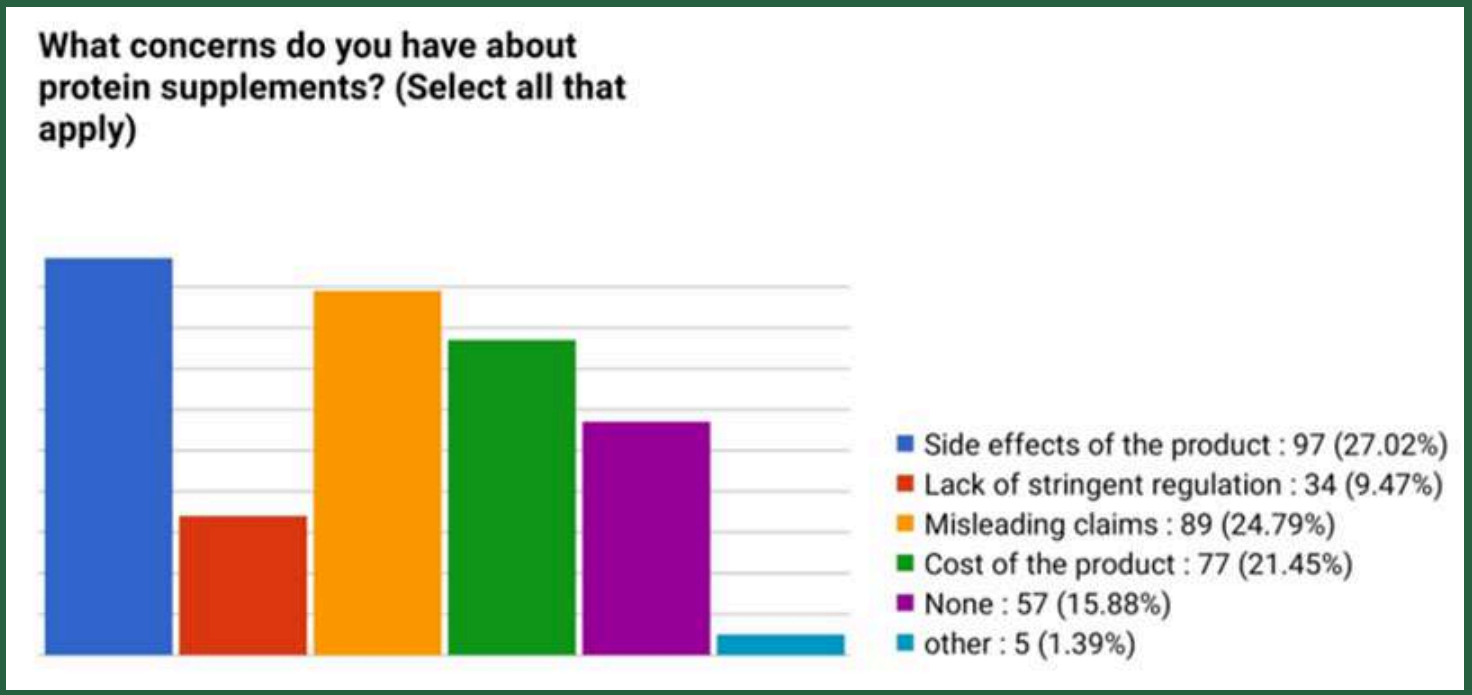
- Fitness professionals and athletes actively read labels for protein content, additives, and overall nutritional value. This profession exhibited greater awareness when it comes to reading labels, regulatory frameworks, etc. 80% of them always read labels and are also aware of the probable health effects due to excessive consumption of the protein supplement products. On observing the purchasing behaviour, 50% of people relied on their gym trainer, followed by e-commerce platforms and pharmacy stores.

- Office professionals and students check labels quite often as 66% students and 69% office workers read nutrition labels before purchasing the food supplement product.

  This category is also aware about the FSSAI, and significant proportion of people understand health claims mentioned on the food label. While students expressed costing as one of the major concern, office workers are more concerned about the side effects of the protein products on human health.

- Other professionals show varied practices, depending on health awareness and dietary habits. 46% of people in this category showed preference for pharmacy stores over e-commerce platforms for purchasing protein supplements. 70% of people in this category are aware of FSSAI and 57% read nutrition labels before purchasing. They focused more on brand name and ingredients on the food label rather than other information. While 43% of the population had no concern regarding protein supplements, few segments highlighted concerns based on side effects of the product, misleading claims, lack of stringent regulation and costing of the supplement products.

Overall, the below mentioned graph summarizes the concerns regarding protein supplements:



5.3 Key Findings of the Survey

The survey highlights significant variations in consumer perception regarding protein-based food products across gender, age, and profession.

The key findings could be:

01

Majority of the population believes that protein supplements are primarily consumed for muscle building or weight management purpose over other factors.

02

Across most demographics, protein powder is the most preferred supplement format.

03

Younger groups prefer supplements for convenience; older groups rely on natural sources & medical advice.

04

Majority of the population, i.e., 83% of people, are aware of FSSAI and 66.5% of the population read nutrition labels.

05

Most people, regardless of age or profession, use protein supplements as an addition to their diet, not a meal replacement on regular basis.

06

A greater proportion of females believe that protein supplements should be prescribed by doctors or certified health professionals.

07

Observing the trend in purchase behaviour, e-commerce platforms like Amazon, Flipkart, etc. were the most preferred platform for buying protein supplements, followed by pharmacy and other sources in order.

08

When asked about the most checked information on the label, 24% people check Ingredients first, followed by brand name (20%), FSSAI logo and license number (17%) over other information on the label.



Key Learnings of the Report

The findings suggest that targeted awareness campaigns can help bridge knowledge gaps, especially among older individuals and non-fitness-oriented professionals. Encouraging label-reading habits and promoting balanced protein consumption can enhance consumer decision-making. Additionally, addressing concerns about supplements through transparent information may improve acceptance among sceptical groups.

The Indian population is gradually shifting towards protein-conscious diets, but significant gaps remain in awareness, consumption patterns, and attitudes toward supplementation. To bridge these gaps:

- **Educational Campaigns:** Nutrition awareness programs should emphasize the importance of protein beyond muscle building, highlighting its role in metabolism, immunity, and overall health (especially in male population).

- **Affordable Protein Options:** Government initiatives and food brands should focus on making protein-rich foods more accessible, especially for lower-income groups. Fortified foods like protein-enriched atta (flour) and dairy products can help as costing of the food product was received as one of the major concerns across various age groups and professions.

- **Cultural Adaptation:** Protein supplements should be marketed in a way that aligns with Indian dietary habits. For example, protein powders can be integrated into traditional foods like lassi or dal rather than Western style shakes to facilitate innovation and give the consumer a taste of mixing traditional sources with modern product formats.

- **Encouraging Label Reading:** Consumers should be educated on how to read food labels effectively, ensuring they choose high-quality protein sources with clear understanding of claims mentioned on the labels. Besides protein, it is also important to emphasize on the other important information present on the food labels.

Annexure

Q1. What is your age?

- Under 18
- 18–25
- 26–35
- 36–50
- 50+

Q2. Gender:

- Male
- Female

Q3. Occupation:

- Student
- Fitness Professional/Athlete
- Office Worker
- Other (specify): _____

Q3. Occupation:

- Student
- Fitness Professional/Athlete
- Office Worker
- Other (specify): _____

Q4. Do you engage in regular physical exercise?

- Yes, Daily
- Yes,3–5 times a week
- Rarely
- Never

Q5. How often do you consume product of protein supplementation?

- Daily
- 3–5 times a week
- Some time
- Rarely

Q6. What is the main reason for consuming protein supplements?

- Muscle gain
- Weight loss
- Doctor's recommendation
- Sports training
- Medical condition

- Other: (Short answer)

Q7. Do you think that protein supplements should be prescribed by doctor or certified health professional only?

- Yes
- No

Q8. Are you aware of the risks associated with excessive consumption of protein supplements (Example: protein powder, etc)?

- Yes
- No

Q9. Do you ever replace a regular meal (breakfast/lunch/dinner) with a protein supplement?

- Yes, regularly
- Sometimes
- Rarely
- Never

Q10. How often do you include protein rich food in your regular meals?

- Daily
- 3–5 times a week
- 1–2 times a week
- Rarely
- Never

Q 11. Are you aware of any potential health problems associated with consumption protein supplements? (Condition like stomach pain, feeling bloated, weight gain, etc)

- Yes
- No

Q 12. Have you experienced any side effects after consuming protein supplements?

- No side effect
- Stomach Pain
- Feeling Bloated
- Weight Gain
- Kidney related issues
- Digestive problem
- Allergic reaction

Q13. Where do you usually purchase them from?

- E commerce (Amazon, Flipkart, etc.)
- Pharmacy

- Gym or trainer
- Other:

Q14. Which of the following protein sources are you familiar with?

- Whey (from milk)
- Casein
- Soy (plant-based)
- Pea (plant-based)
- Rice (plant-based)
- Hemp (plant-based)
- Collagen (for skin, joints, etc.)
- Egg white
- Other: _____

Q15. Are you aware of FSSAI (Food Safety and Standards Authority of India),the body that regulates food products in India ?

- Yes
- No

Q16. Do you read the nutrition label before purchase?

- Always
- Sometimes
- Never

Q17. What do you usually check before buying a protein supplement?

- Ingredients
- FSSAI logo or license number
- Brand name
- Online reviews
- Health claims on pack
- Certifications (e.g., NSF, Informed-Sport)

Q 18. Do you understand the health claims mentioned on the label (e.g., builds muscle)?

- Yes
- Partially
- No

Q 19. Have you ever consumed a higher dosage of protein powder than the recommended amount mentioned on the label.

- Yes, I consume more than the recommended dosage.
- No, I follow the recommended dosage on the label.

- I don’t check or read the recommended dosage.
- Not sure about the amount I consume.

Q 20. What concers do you have about protein supplments? (select all that apply)

- Side effects of the product
- Lack of stringent regulation
- Misleading claims
- Cost of the product
- None
- Other

Q 21. In what form do you usually consume protein supplements?
(You can select more than one)

- Protein powder
- Protein bar
- Capsules
- Tablets
- Ready-to-drink shakes
- High-protein cookies/snacks
- Others (please specify):

Q 22. What is your preferred source of protein? (select the most suitable option)

- Animal-based (meat, eggs, dairy)
- Plant-based (lentils, soy, nuts, seeds)
- Packaged health supplements/nutraceuticals, etc. (whey, protein bars)
- Does not consume much protein sources

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