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Page: 1-18

ADVANCING CALCIUM SUPPLEMENTATION IN BANGLADESH: THE ROLE OF WBCIL TO MANUFACTURE LIPOSOMAL CORAL CALCIUM IN ENHANCING ABSORPTION AND TOLERABILITY

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ABSTRACT

The global market for essential micronutrient supplementation is undergoing a crucial shift toward advanced, highly bioavailable delivery systems to combat widespread mineral deficiencies. This shift is motivated by the limited absorption and poor gastrointestinal tolerability of traditional calcium salts, such as Calcium Carbonate, which historically dominate import volume. Consumer and clinical demand are accelerating the adoption of superior forms, notably Coral Calcium, which accounted for approximately 72.7% of sales volume in one of the key regional markets of Bangladesh in 2023.

This paper examines the clinical and economic rationale for the next-generation supplement, Liposomal Coral Calcium, which represents the forefront of this shift. This advanced formulation utilizes lipid encapsulation to protect the compound from gastric degradation, thereby maximizing absorption and mitigating common gastrointestinal side effects like constipation. The enhanced efficacy and superior tolerability of this advanced formulation, manufactured by West Bengal Chemical Industries Ltd., Kolkata, India (WBCIL), offer a significant opportunity to improve bone health outcomes and enhance compliance, particularly among vulnerable groups in nations facing a pervasive public health challenge due to high micronutrient deficiency rates. Recognizing that chronic calcium deficiency carries a measurable economic cost—the "Calcium Economy"—due to healthcare expenditure on musculoskeletal disorders and reduced national productivity, this review advocates for the broader adoption of high-quality, advanced delivery systems like Liposomal Coral Calcium as a strategic, cost-effective public health investment for sustainable national health improvement.

Introduction

Calcium deficiency represents a critical global public health concern, contributing to the broader phenomenon of "hidden hunger" that impacts more than half of the world's population. With an estimated 3.5 billion people worldwide at risk of inadequate calcium intake, this deficiency is having a disproportionate and significant impact, particularly on populations in South Asia.[1] This context sets the stage for the public health landscape in Bangladesh, which is marked by a persistent high

prevalence of calcium deficiency, leading to severe health issues like stunting and imposing substantial health and economic consequences on the country. The public health landscape of the nation is significantly burdened by a high prevalence of calcium deficiency, often compounded by Vitamin D insufficiency. This situation is particularly critical for vulnerable groups, specifically young children and women of reproductive age, due to their increased physiological needs. The key health consequences of this deficiency include stunting in children, meaning they fail to reach their full genetic growth potential. Calcium deficiency profoundly affects a nation's economic and wellness scenario by reducing human capital and increasing healthcare costs. The resulting health issues, such as stunting and long-term skeletal morbidities, diminish labour productivity and earning potential throughout an affected individual's lifetime. As a leading manufacturer of advanced nutraceutical solutions, West Bengal Chemical Industries Ltd., Kolkata, India (WBCIL) is poised to revolutionize the calcium supplementation landscape in Bangladesh. We recognize that despite significant import volumes of traditional calcium salts and the recent adoption of Coral Calcium, the persistent health challenge of calcium deficiency remains unsolved due to inherent limitations in absorption and tolerability. WBCIL's market entry is driven by a commitment to public health, offering the next-generation solution: Liposomal Coral Calcium. This technological breakthrough guarantees dramatically enhanced bioavailability and patient compliance, making it the strategic, superior answer to the nation's calcium crisis.

This article provides a comprehensive market research analysis, conducted by WBCIL, of the evolving landscape of calcium supplementation in one of the South-Asian countries, such as Bangladesh, where calcium deficiency is a persistent public health concern.[1] The market research data compels the positioning of Liposomal Coral Calcium as a critical technological and public health advancement, directly addressing the limitations of current market offerings. The context should begin by establishing the situation of the calcium deficiency challenge. Bangladesh has demonstrated a commendable commitment to addressing its pervasive calcium deficiency. Over the past five years, the country has imported substantial quantities of calcium supplements to support these efforts. The most frequently imported active pharmaceutical ingredients (APIs) are enumerated here.[2] However, despite this huge import volume, the issue was not completely resolved. This shortcoming is directly attributable to the poor bioavailability and adverse gastrointestinal side effects of these conventional salts.[3] This persistent challenge led to a clear requirement for a superior, organic calcium source.[4] The structural affinity of calcium sources plays a crucial role in bone integration, as the foundational mineral matrix of our bones is composed of calcium phosphate (Ca-P), primarily in the form of hydroxyapatite. In contrast, calcium derived from inorganic, "rock calcium" sources like limestone (Calcium Carbonate, $CaCO_3$) is crystalline and lacks this vital Ca-P structure, which significantly limits its absorption affinity and subsequent deposition into the bone matrix. While dairy is a common source, the landscape of organic calcium sources extends far beyond, offering superior compatibility with human physiology. These sources are inherently organic because they are metabolized from biological

structures—plants, seeds, or the mineralized remains of aquatic life—and are thus presented to the body in a food matrix, which can enhance absorption.

Table 1: Marine Sources of Calcium.

Source	**Primary Chemical Form of Calcium**	**Key Characteristics & Concentration**	**Utilization/Processing Notes**
Fishbones	Hydroxyapatite ($Ca_5(PO_4)_3OH$)	Significant source, comprising 10–15% of fish body weight; high calcium content (135–147 g/kg dry matter).[5]	Must be processed (removing fat/protein, superfine crushing) for large fish to improve dissolution and absorption. Small fish (like anchovies) can be consumed whole.
Shells (e.g., Scallop)	Calcium Carbonate ($CaCO_3$) (up to 95%)	Very rich source, making up approx. 60% of shellfish mass; offers greater potential calcium output than fishbones. Demonstrated good solubility and bioavailability.[5]	Utilization remains low despite being commercialized; requires further development.
Crustacean Shells (e.g., Shrimp, Crab)	Calcium Carbonate ($CaCO_3$), Chitin, Protein	Derived from processing waste (30–40% of marine resource waste).	Focus of industrial research is often on chitin and protein; calcium is typically recycled as a by-product (e.g., calcium lactate). Small amounts can be ingested directly.[5]
Seaweed (e.g., Red Algae *Lithothamnion*)	Mineral-rich (often calcified skeletal remains)	High concentration (e.g., Aquamin is up to 31% calcium by weight). Shows better efficacy than standard $CaCO_3$; has a beneficial anabolic effect on bone calcification.	High bioavailability, especially when combined with other marine sources (like oyster shell powder).[5]

Marine-derived calcium comes from several key sources, each with distinct chemical forms and utilization characteristics. Fishbones contain hydroxyapatite ($Ca_5(PO_4)_3OH$) and account for 10–15% of fish body weight, providing 135–147 g

calcium per kg of dry matter; large fish require fat/protein removal and superfine crushing to improve absorption, while small fish such as anchovies can be consumed whole. Shells like scallops are composed of up to 95% calcium carbonate—around 60% of total shell mass—and offer higher potential calcium output than fishbones, with demonstrated good solubility and bioavailability, though their utilization remains low despite commercialization. Crustacean shells (shrimp, crab) also contain calcium carbonate along with chitin and protein, representing 30–40% of marine processing waste; industrial focus often targets chitin and protein, leaving calcium to be recycled mainly as by-products such as calcium lactate, though small amounts can be consumed directly. Calcified seaweeds such as red algae (e.g., *Lithothamnion*) are mineral-rich and can contain up to 31% calcium (as in Aquamin), showing superior efficacy to standard $CaCO_3$ and enhancing bone calcification, with high bioavailability that improves further when combined with other marine calcium sources like oyster shell powder.[5]

Coral Calcium is considered better than many other organic calcium forms because, in addition to being $CaCO_3$ like other organic sources, it is harvested from fossilized marine coral, giving it a unique, porous structure and a natural blend of magnesium, strontium, and other trace minerals that more closely mirrors the complex mineral profile required for bone health, theoretically enhancing both its dissolution and its overall metabolic utility compared to simpler organic salts.[6]

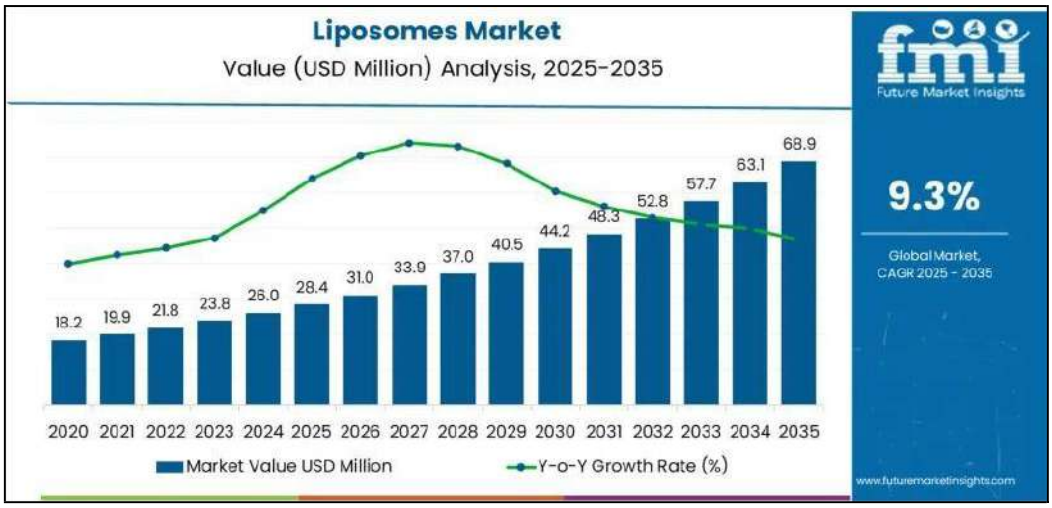

Figure 1: Growth Forecast for the Liposomes Market through 2035 [8]

[8: Extracted directly from Future Market Insights 2025]

Bangladesh took a commendable step to fight this deficiency, evidenced by the elaborate usage and rapid dominance of Coral Calcium in the last few years, which accounted for approximately 72.7% of the sales volume in one of the key regional markets. Nevertheless, even after this significant shift to Coral Calcium, the fundamental issues of limited absorption and tolerability still prevail, as the core compound remains $CaCO_3$.[7] The global supplement market is rapidly shifting toward liposomal delivery systems, a trend primarily driven by consumer demand for products with higher efficacy and better absorption. The Global Liposomal Supplements Market was valued at US$349.92 million in 2024 and is projected to

reach approximately US$745.02 million by 2034.[8] The market is expected to expand at a CAGR of 7.85% from 2025 to 2034. Here comes the role of Liposomal Coral Calcium, which WBCIL proposes as the true Game Changer in the country. This product utilizes advanced liposomal encapsulation to shield the Coral Calcium from gastric degradation, enabling absorption rates of 90-95% (compared to 20-40% for conventional forms) and virtually eliminating common side effects like constipation. WBCIL provides a superior, highly bioavailable solution with Liposomal Coral Calcium to address bone-related disorders in the country.[6,7]

The present article proceeds through a logical progression: We first offer an Overview of Calcium Supplementation Practices in South-Asian countries including Bangladesh, establishing the prevalence of micronutrient deficiencies and the market shift. Next, we analyse Calcium Supplementation Trends and Developments in the country in the last five years, using import and sales data to track market growth and the increasing dominance of Coral Calcium over traditional salts. The article then delves into the physiological and therapeutic advantages of coral calcium compared to conventional forms, establishing the baseline for superior efficacy. This leads directly to the core innovation, Liposomal Coral Calcium as a Game Changer in the country, detailing how advanced encapsulation addresses limitations in absorption and tolerability. We broaden the scope by examining The Calcium Economy of a Country, highlighting the macro-level economic consequences of widespread deficiency. Finally, we conclude by detailing the role of WBCIL in manufacturing Liposomal Coral Calcium—leveraging our expertise with the provision of high encapsulation efficiency—as a strategic solution for Bangladesh's persistent calcium deficiency challenge.

Overview of Calcium Supplementation Practices in the South-Asian Country-Bangladesh

Micronutrient deficiencies represent a widespread global public health concern, impacting more than half of the world's population. It is having a disproportionate impact on populations in South Asia and Sub-Saharan Africa. In fact, an estimated 3.5 billion people worldwide are at risk of inadequate calcium intake, a critical mineral deficiency that leads to serious health and economic consequences.[5] This context of "hidden hunger" sets the stage for the public health landscape in Bangladesh, which is marked by a persistent high prevalence of micronutrient deficiencies and stunting, an underlying issue that frames the country's approach to supplementation.[1] Over the past five years, calcium supplementation has evolved from a targeted intervention for severe deficiencies to a widely adopted dietary practice, particularly among vulnerable groups and the educated youth.[2] A key trend is the extensive prevalence of dietary supplement (DS) use, with studies indicating high adoption rates among adolescents (upwards of 83% in some cohorts) and a notable inclination among undergraduate female students. While multivitamins are the most common, calcium (Ca) is one of the most frequently used single-nutrient supplements, reported by approximately 37% of DS users.[3]

Table 2: Overview of Calcium Supplementation Practices in Bangladesh

Key Trend	Finding	Implication
High Prevalence of Use	High DS use among adolescents and students, often without a physician's prescription.	Indicates a growing self-care culture and increased health consciousness/aspirational use, potentially fuelled by media or peer influence.[4]
Primary Use Rationale	Supplements are consumed for general health and well-being, as energy sources, and as immune boosters.	The market is driven by proactive health maintenance rather than solely therapeutic need.[3,4]
Vulnerable Populations	Female and rural populations exhibit a higher burden of dietary calcium inadequacy. Pregnant and lactating women are key targets for supplementation programs.	The market is bifurcated, serving both a large, medically-advised patient base (e.g., women) and a burgeoning lifestyle-focused consumer base.[2]

To present the key findings and usage patterns, it is necessary to highlight that the market for calcium supplements has diversified to address the chronic issue of low dietary calcium intake.[5] The country's cereal-based diet and high presence of antinutrients contribute to a significant deficiency gap.[6]

Table 3: Different sources of Organic Calcium Supplements.

Source Type	Specific Origin / Common Examples	Key Calcium Form & Co-Factors
Plant-Based (Algae)	Calcified Red Algae (e.g., *Lithothamnion calcareum*), often sold as Aquamin.	Calcium Carbonate, Magnesium, Boron, Strontium (in a whole-food matrix).
Microcrystalline	Bone Tissue (Bovine Source)	Microcrystalline Hydroxyapatite (MCHA) (Calcium Phosphate)
Marine Shells	Fossilized Coral (Coral Calcium), Oyster Shells.	Primarily Calcium Carbonate.
Fermented/Postbiotic	Calcium-enriched *Lactobacillus* or *Saccharomyces cerevisiae* (Yeast/Bacteria).	Calcium bound in a Postbiotic Matrix.

This table highlights the diversity within the "organic" calcium supplement category, all of which aim to offer a more bioavailable and nutritionally complete alternative to isolated chemical salts. Specifically, Coral Calcium and other Marine Shell sources, which are comprised largely of calcium carbonate from fossilized material, are highly valued globally for their structure and mineral profile. The fibrous, highly porous nature of coral and its inclusion of a wide spectrum of essential trace minerals (often

over 70, including magnesium, zinc, and strontium) are frequently cited as the reasons for its superior absorption and ability to work synergistically for bone health, surpassing the effects of standard calcium carbonate in some studies. When compared to the plant-based algae sources or the biological MCHA, coral calcium stands out for delivering this extensive natural mineral complex, positioning it as a comprehensive mineral source for overall wellness, beyond just calcium delivery. In the commercial sector, Coral Calcium has established a strong foothold. Numerous local pharmaceutical giants market branded Coral Calcium supplements (e.g., CoralCal-D, MarinCal-D, Cora-D).[7] Coral Calcium is marketed on the premise of its marine origin and a chemical structure that is highly similar to human bone, claiming better absorption than traditional calcium carbonate. This positioning highlights a consumer preference for, and market shift toward, bioavailable and natural-source products.[5,6] The market's next frontier lies in the adoption of advanced delivery systems, with the concept of Liposomal encapsulation representing a significant technological development.[7] Liposomal Coral Calcium leverages this innovation by encapsulating the calcium compound within a lipid (fat) bilayer. This mechanism delivers multiple clinical and consumer benefits: the lipid layer provides protection from degradation in the harsh digestive environment, thereby promising enhanced bioavailability.[8] Furthermore, this targeted delivery system facilitates direct cellular uptake, leading to optimized absorption rates compared to conventional oral formulations. Crucially, the technology also mitigates common gastrointestinal side effects, such as constipation and bloating, often associated with high-dose calcium salts by preventing the calcium's direct interaction with the intestinal mucosa.[9] The introduction of this highly bioavailable Liposomal technology signals a maturation of the Bangladeshi supplement market, where manufacturers are increasingly competing on proven efficacy and superior absorption rates rather than focusing solely on dosage or pricing.[10]

Public health efforts over the past five years have concentrated strategically on both immediate supplementation and long-term food-based strategies to address calcium deficiency.[9] While national programs continue to prioritize providing Iron-Folic Acid (IFA) to pregnant women, clinical evidence from local studies has strongly advocated for supplementing Calcium and Vitamin D (VD-Ca) in other at-risk groups.[11] For instance, interventions targeting low-income garment factory workers have shown that VD-Ca supplementation is a critical strategic option for reducing the risk of musculoskeletal conditions like osteomalacia and osteoporosis. Simultaneously, recent research has focused on Food Fortification to sustainably close the national calcium gap. These studies suggest that a combined strategy is most effective: promoting locally available high-calcium foods, such as small fish, alongside the fortification of staple items like calcium-fortified wheat flour or drinking water.[12] This comprehensive approach is modelled as a sustainable and cost-effective solution to meet the Recommended Nutrient Intake (RNI) across diverse demographic groups, particularly within rural and low-income populations.[13]

Biological superiority of marine-derived Coral Calcium over other organic calcium salts

The perceived biological superiority of marine-derived Coral Calcium over simpler organic calcium supplements fundamentally rests on its unique physicochemical structure and comprehensive mineral composition.[14] Derived from fossilized Scleractinian corals, its calcium exists in the aragonite crystal phase, which imparts a highly microporous structure with an enhanced surface area compared to common calcium carbonate, thus promoting rapid dissolution and efficient initial Ca^{2+} solubilization in the digestive tract.[5,6] This structural feature is hypothesized to facilitate more complete enzymatic conversion into bioavailable Ca^{2+} ions, which are subsequently integrated into the bone's hydroxyapatite matrix.[15] Critically, Coral Calcium provides a natural, complex mineral profile, including essential co-factors like magnesium and strontium, which work synergistically to enhance the activity of bone-building enzymes and actively support bone regeneration and density, often proving more effective than isolated salts in managing bone-related disorders.[6] This holistic composition also extends its systemic benefits to include assisting with cellular signalling pathways that support vascular tone and blood pressure regulation, as well as providing necessary ions for the remineralization of dental enamel.[15]

WBCIL promotes its marine-derived Coral Calcium as a superior solution to address widespread calcium deficiency, highlighting its advantages over traditional rock-based calcium carbonate sources which often carry risks like heavy metal contamination. Coral calcium, sourced from non-living marine sand through stringent, multi-stage purification processes, is naturally composed of calcium carbonate, magnesium, and over 70 trace minerals, making its structure more similar to human bone. This unique composition, particularly the inclusion of magnesium and other co-factors, enhances absorption and efficacy, making it a better choice for bone health, reducing the risk of conditions like preeclampsia, and potentially offering protection against dental cavities. Crucially, WBCIL is also a pioneer in the manufacturing of the next-generation Liposomal Coral Calcium, which utilizes advanced encapsulation technology to dramatically boost bioavailability and eliminate the gastrointestinal side effects common to all non-liposomal forms. WBCIL's commitment to quality is paramount, with the company rigorously testing the final product for heavy metals like lead and mercury, ensuring its calcium supplements are safe, pure, and highly effective alternatives for consumers.

Calcium Supplementation Trends and Developments in Bangladesh in last five years

Table 4: Trends in calcium supplement imports to Bangladesh from 2020 to 2025, highlighting the top imported types.

Compound	Period		Import Value (USD)	Quantity (kg)
Calcium Citrate	Nov-Nov	2020–21	73,524.00	30,025
	Dec-	2021-22	1,27,768.00	47,271

Compound	Period		Import Value (USD)	Quantity (kg)
	Nov	2022-23	91,764.00	50,166
		2023-24	1,55,234.00	59,194
		2024-25	1,92,804.00	95,467
Calcium Lactate Gluconate	Nov-Nov	2020–21	14,95,864.00	2,62,713.26
	Dec-Nov	2021-22	17,60,998.50	2,81,286
		2022-23	10,03,879.82	1,67,258
		2023-24	16,30,997.67	2,24,457.3
		2024-25	8,22,438.46	1,40,090.2
Calcium Acetate	Nov-Nov	2020–21	78,224.25	52322.85
	Dec-Nov	2021-22	81,482.00	20,872.85997
		2022-23	1,78,687.15	74,741.59997
		2023-24	4,03,411.81	80,847.89016
		2024-25	3,35,664.5013	2,11,566.1001
Calcium Orotate	Nov-Nov	2020–21	22,78,284.38	86,502.74
	Dec-Nov	2021-22	11,40,099.68	43,004.94
		2022-23	3,56,850.90	14,397.06
		2023-24	15,30,918.37	41,098.72
		2024-25	4,23,784.95	16,287.16
Calcium Carbonate	Nov-Nov	2020–21	4,23,10,951.73	24,44,43,007.7
	Dec-Nov	2021-22	4,61,98,942.47	20,19,81,255.3
		2022-23	4,33,26,339.59	21,71,66,115.2
		2023-24	4,23,89,593.39	17,20,66,959.6
		2024-25	3,52,07,043.46	15,58,13,328.2

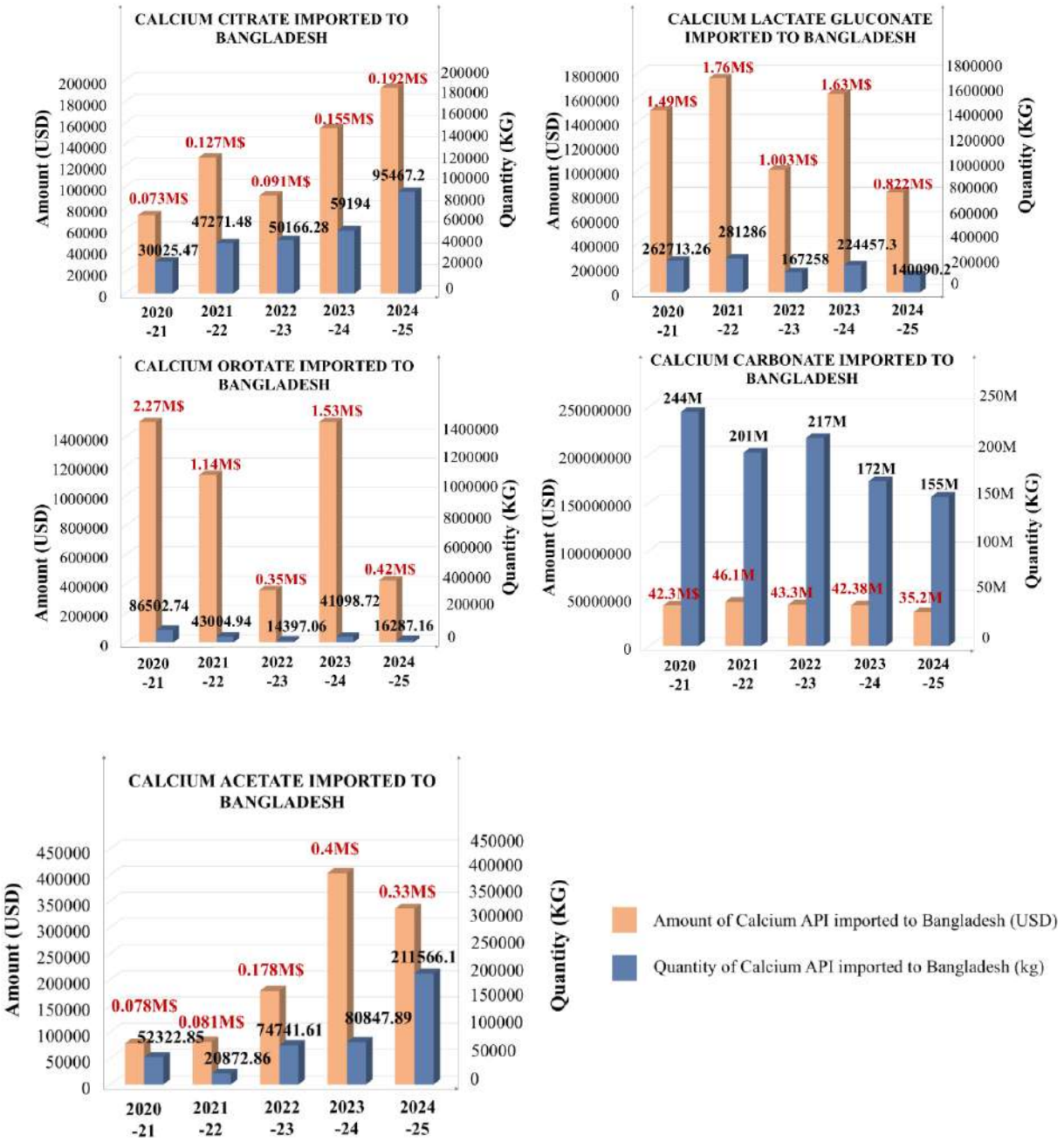

Figure 2: Overview of Calcium Supplement Imported to Bangladesh received from export import data under 28 & 29 HS Code in Amount (USD) and Quantity (KG) from 2020 to 2025.

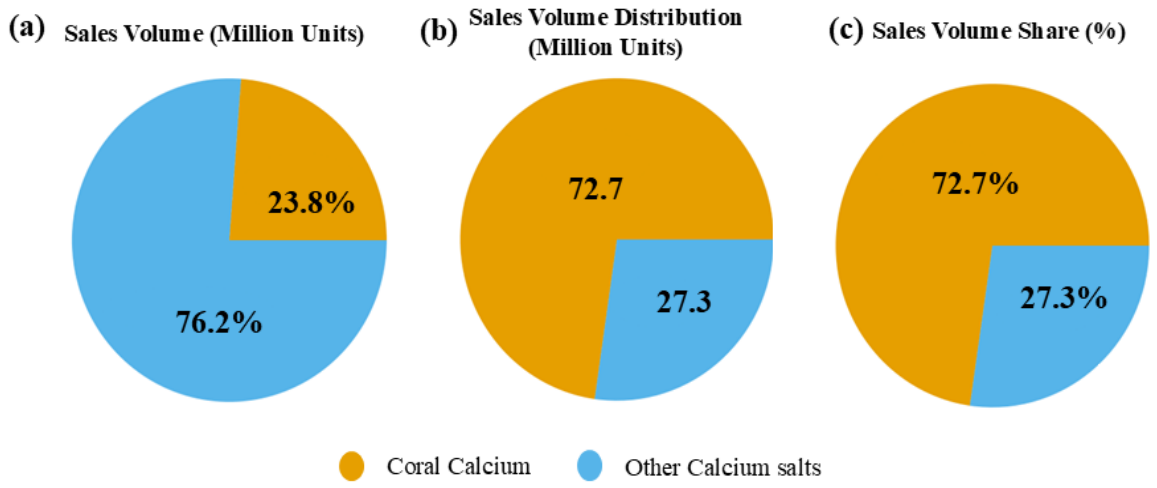

Figure 3: Market Dynamics of Calcium Supplement Sales Volume, Highlighting the Shift to Coral Calcium (2020-2025) : (a) Sales Volume: Initial Market Share, showing Other Calcium Salts dominating sales volume over Coral Calcium in 2020, (b) Sales Volume Distribution: Current Market Share, illustrating the fundamental shift to Coral Calcium dominance over Other Calcium Salts in 2025, and (c) Sales Volume Share (%): Providing a clear comparison of the final volume share in 2025.

The data presented in Figure 2 reveals that Calcium Carbonate overwhelmingly dominates the market in both total value and quantity among the five calcium supplement types tracked, while the other forms represent smaller, specialized segments of the market. The time range analyzed for all four products covers five distinct one-year periods, generally running from November/December of one year to November of the next, starting with the period from 11/2020 to 11/2021 and concluding with from 12/2024 to 11/2025. Calcium Carbonate imports dwarf all other forms, reflecting its status as the most heavily imported calcium compound, likely due to its use in bulk pharmaceuticals and industrial applications in addition to supplements. Total imports reached a massive $209.43 million USD in value and nearly 991.47 million KGS in quantity over the five periods. This scale suggests that Calcium Carbonate is the foundation of the calcium market in Bangladesh. Calcium Lactate Gluconate (CLG) and Calcium Orotate represent the next tiers in terms of total value. CLG imports totaled approximately $6.71 million USD and 1.08 million KGS. Calcium Orotate, a less common but often highly-priced form, accounted for $5.73 million USD in value, despite a significantly smaller quantity of only about 201,291 KGS. The high value-to-quantity ratio for Calcium Orotate suggests it is a high-cost, specialized import. Calcium Citrate represents the smallest market segment among the four, totaling just over 641,000 USD in value and approximately 282,124 KGS in quantity. While still a measurable component of the market, its overall volume and value are the lowest, suggesting it caters to a much smaller segment of the supplement-consuming population compared to the other compounds.

Figure 3 effectively illustrates a significant paradigm shift in the calcium supplement market over the period of 2020 to 2025, specifically driven by the move toward organic, marine-derived sources. The initial market share in 2020 (a) was characterized by the dominance of Other Calcium Salts (e.g., Calcium Carbonate),

reflecting traditional market reliance on cheaper, mass-imported formulations. However, by 2025 (b and c), the market dynamics show a fundamental reversal, with Coral Calcium achieving a dominant position, signalling a consumer- and public-health-driven preference for a product perceived as having superior efficacy and greater organic appeal. This shift from a conventional to an organic market leader sets the necessary foundation for the introduction of Liposomal Coral Calcium as the next logical step in technological advancement.

Monthly update of Coral Calcium import to Bangladesh

The provided import data for Coral Calcium (under HS Codes 28 & 29) into Bangladesh reveals a fluctuating yet significant market demand from January 2024 through November 2025, underscoring the growing importance of this supplement. In the calendar year 2024, imports peaked in September with the highest total value of $1,670,477.52 USD and the highest quantity at 276,000 KGS. The first half of 2024 showed strong volume, with February and March imports each exceeding $1.2 million USD and 218,000 KGS. However, there was a noticeable dip in June 2024, recording the lowest figures for the year at $147,345 USD and 48,000 KGS. The import trajectory for 2025 shows early volatility, with February and April registering notably low values and quantities (e.g., April at $280,364.18 USD and 34,000 KGS). Conversely, imports surged dramatically in July 2025, reaching a peak value of $2,133,341.39 USD and the largest quantity in the entire dataset at 336,300 KGS, suggesting major strategic procurement or market stocking during that month. By contrast, the partial data for November 2025 is lower, indicating a potentially slower close to the year, reflecting ongoing, though irregular, large-scale demand for Coral Calcium within the Bangladeshi market.

Table 5: Monthly import volumes of coral calcium supplements to Bangladesh (2024–2025)

YEAR	MONTH	TOTAL VALUE (USD)	QUANTITY (KGS)
2024	JANUARY	537400.00	105500
	FEBRUARY	1592329.68	241000
	MARCH	1294415.00	218907.8
	APRIL	967586.64	221000.9
	MAY	1066605.88	198000
	JUNE	147345.00	48000
	JULY	816384.74	109000
	AUGUST	1233471.03	213000
	SEPTEMBER	1670477.52	276000
	OCTOBER	1134353.06	215400
	NOVEMBER	931448.23	177600
	DECEMBER	995348.60	135500.5
2025	JANUARY	549354.58	104700
	FEBRUARY	281414.41	80000
	MARCH	795968.18	129000
	APRIL	280364.18	34000
	MAY	285527.4382	61400
	JUNE	749100.00	106200
	JULY	2133341.39	336300
	AUGUST	1303120.00	166300
	SEPTEMBER	745291.72	104001.4
	TILL 10TH NOVEMBER	428152.71	93000

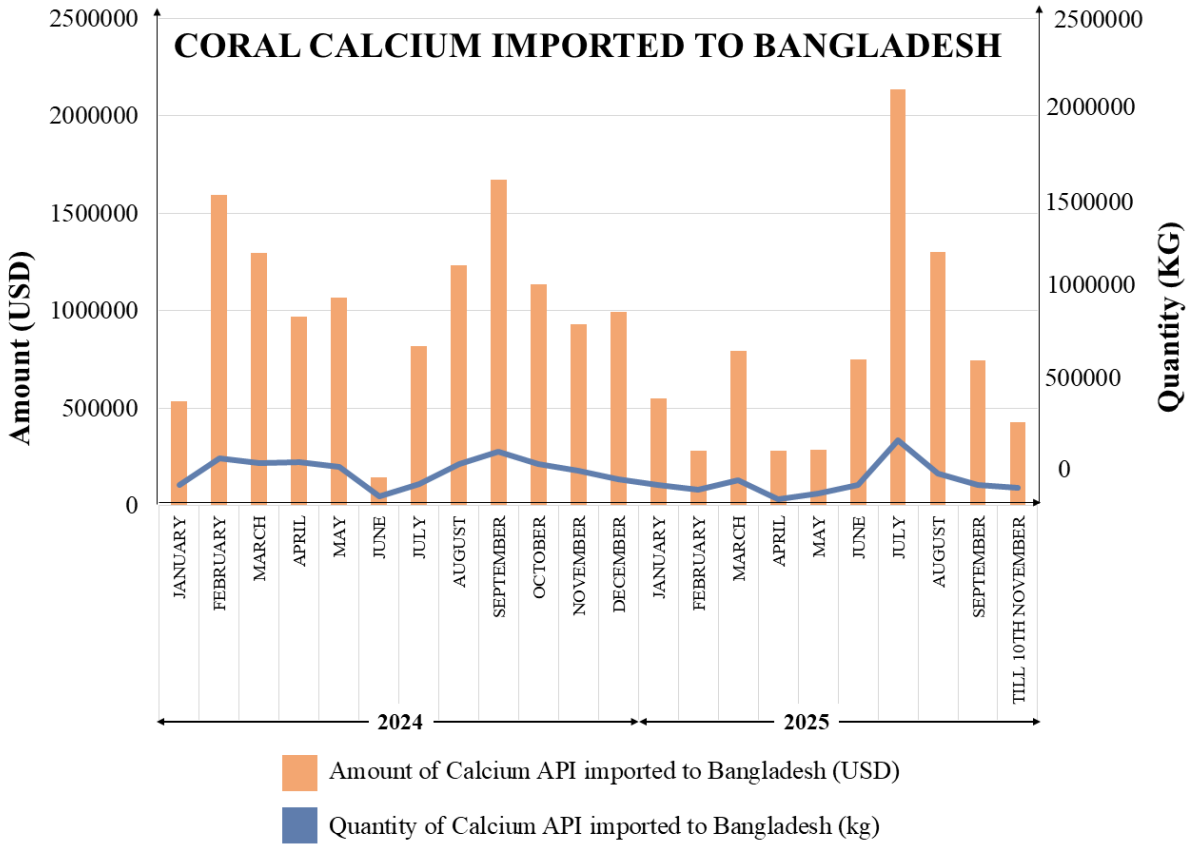

Figure 4: Graphical representation of Monthly Import Data: Coral Calcium to Bangladesh (HS Codes 28 & 29)

The provided data tracks the import of Coral Calcium to Bangladesh under HS Codes 28 and 29, covering a period of 22 months from January 2024 up to November 10, 2025 (with the final entry representing a partial month). Over this entire period, the total import value amounted to approximately 19.94 million USD, corresponding to a total quantity of roughly 3.37 million KGS. On a monthly average, Bangladesh imported Coral Calcium valued at about 906,309 USD, with an average monthly quantity of approximately 153,355 KGS. This data provides a detailed, granular look at the trade volume and value of this specific commodity over a nearly two-year span.

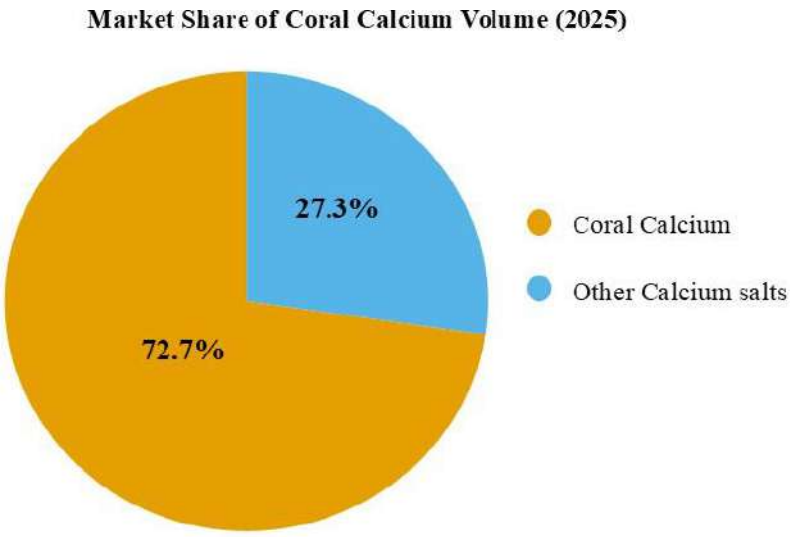

Figure 5: Comparative Annual Sales Volume of Calcium Supplement Formulations in Bangladesh (2025): Illustrating the dominance of Coral Calcium capturing approximately 72.7% of the total sales volume in comparison to Other Calcium Salts (including traditional carbonates) accounted for the remaining 27.3%

The Comparative Annual Sales Volume (Figure 5) illustrates a crucial shift in consumer preference and market dynamics. Coral Calcium sales volume saw a robust growth trajectory, nearly tripling from 1.5 million units in 2020 to 4.0 million units in 2025. This explosive growth confirms the product's successful market penetration, supported by its premium positioning and marketing emphasis on superior bioavailability. The sales volume for Other Calcium Salts (Calcium Carbonate and Citrate) showed only a modest initial increase (from 4.8 million units in 2020 to 5.1 million units in 2021), followed by a notable contraction to 1.5 million units by 2025. This pattern strongly suggests a substantial substitution effect, where consumers are actively shifting away from traditional, lower-priced salts toward the advanced Coral Calcium formulation.

This dramatic evolution in consumer choice is concretely quantified by the Market Share of Calcium Supplement Sales Volume in 2025 (Figure 5). The detailed market analysis reveals that Coral Calcium has successfully captured an overwhelming majority, dominating the volume share with approximately 72.7% of the total sales volume in 2025. With Other Calcium Salts accounting for the remaining 27.3%, this strong market share fundamentally validates the hypothesis: the success of advanced formulations, primarily represented by Coral Calcium (including novel delivery systems like the Liposomal form), has permanently altered the competitive structure of the supplement market, establishing it as the leading choice for informed consumers. This data, drawn from proprietary market intelligence for the period, highlights a consumer-driven transition toward high-efficacy supplementation.

The Physiological and Therapeutic Advantages of Coral Calcium

Coral Calcium offers distinct physiological and therapeutic advantages over conventional calcium salts, setting a higher benchmark for supplementation efficacy. Unlike synthetic Calcium Carbonate, Coral Calcium is a natural, biogenic form often complemented by a full spectrum of essential trace minerals (e.g., magnesium, strontium) in a naturally balanced ratio.[10] This synergistic mineral profile is suggested to enhance the body's utilization of calcium. Furthermore, clinical trials comparing it with non-coral Calcium Carbonate and Calcium Citrate Malate have indicated that calcium from a coral source exhibits superior bioavailability, showing a significantly higher rise in blood calcium concentration and a greater area under the curve (AUC) post-ingestion.[11] This improved absorption is partly attributed to the coral structure's bioactive nature and its ability to rapidly ionize in the digestive tract. Coral Calcium is generally considered to be well-tolerated, with studies reporting no adverse events beyond those typically associated with calcium supplementation.[12] The unique composition and pH profile contributes to better gastrointestinal comfort compared to the pure alkaline nature of high-dose Calcium Carbonate, which often requires high stomach acid levels for optimal absorption.[13] In the long term, this superior absorption and trace mineral support is theorized to provide better efficacy in maintaining Bone Mineral Density (BMD) and supporting non-skeletal functions, such as cardiovascular and muscular health.[14] This improved absorption is partly attributed to the coral structure's bioactive nature and its ability to rapidly ionize in the digestive tract. This same study also reported no adverse events across any of the groups, supporting the notion that Coral Calcium is generally considered to be well-tolerated.[16] The unique composition and pH profile contributes to better gastrointestinal comfort compared to the pure alkaline nature of high-dose Calcium Carbonate, which often requires high stomach acid levels for optimal absorption.

Proposed Liposomal Coral Calcium as a Game Changer in Bangladesh

The advent of Liposomal Coral Calcium represents a potential revolution for calcium supplementation in the Bangladeshi market by addressing the critical limitations of standard oral formulations: poor absorption and gastrointestinal side effects.[13,14] The encapsulation of Coral Calcium in a lipid bilayer (liposome) protects the calcium from degradation by stomach acid and digestive enzymes. This protection allows the payload to be delivered intact directly to the intestinal cells, bypassing competitive absorption mechanisms and resulting in significantly enhanced absorption rates.[15] The main advantage of Liposomal Coral Calcium is its potential to utilize the lymphatic delivery pathway, which significantly enhances its bioavailability compared to standard oral supplements.[15] This is crucial for at-risk groups, such as the elderly or those with compromised digestive function. By mitigating common gastrointestinal side effects—such as constipation, bloating, and dyspepsia—which plague conventional high-dose calcium supplements, liposomal delivery dramatically improves patient compliance.[11] High compliance is paramount for achieving the sustained calcium intake necessary to combat chronic deficiencies prevalent in low- and middle-income groups.[16] Optimized absorption means lower effective doses could be used, or that high-dose therapeutic strategies become more successful. This reduces the risk of ineffective treatment and consequently lowers the long-term healthcare burden associated with untreated deficiencies, particularly in preventing the progression of osteomalacia and osteoporosis—conditions that require extensive, costly medical management.[17]

The Calcium Economy of a Country

The "Calcium Economy" is an essential lens through which to view national development, asserting that robust calcium status is a fundamental pillar of national health, productivity, and long-term economic sustainability [18]. In nations with rapidly developing economies, such as Bangladesh, widespread calcium deficiency is not merely a health concern—it carries profound, measurable economic consequences. Inadequate calcium intake fuels musculoskeletal disorders, leading to high rates of osteoporotic fractures in the elderly and critical deficiencies among the at-risk working population (e.g., in the garment sector) [19]. The resulting costs for managing these fractures—spanning hospitalization, surgery, and rehabilitation—represent a significant drain on public healthcare budgets. International studies compellingly illustrate that the strategic implementation of cost-effective calcium and vitamin D supplementation can generate substantial net cost savings by preventing thousands of debilitating fractures each year [20]. Furthermore, calcium deficiency, often compounded by Vitamin D insufficiency, severely compromises maternal health, increasing the risk of conditions like preeclampsia, and causes irreversible physical and cognitive impairments during a child's crucial first 1,000 days [21, 22]. This developmental impairment ultimately restricts educational attainment, resulting in a permanent reduction in economic productivity for the affected generation. Therefore, by aggressively prioritizing effective calcium supplementation—specifically utilizing advanced, well-absorbed options like Liposomal Coral Calcium—a country executes a strategic public health investment. This investment yields a superior Return on Investment (ROI) realized through drastically reduced medical expenditure and the creation of a healthier, more productive national workforce, decisively reinforcing overall economic stability.

The Role of WBCIL to Manufacture Liposomal Coral Calcium in Enhancing Absorption and Tolerability

The introduction of Liposomal Coral Calcium—manufactured by WBCIL, Kolkata, India—represents a critical advancement in addressing the pervasive calcium deficiency burden in Bangladesh. WBCIL manufactures Coral Calcium, which is then processed using advanced Liposomal encapsulation technology.[23] The adherence to stringent quality standards in the manufacturing of this cutting-edge formulation ensures minimal contaminants like heavy metals and organic acids, a factor critical for maximizing absorption and minimizing systemic side effects. This technological sophistication guarantees maximal protection of the calcium payload in the gastrointestinal tract and minimal risk of degradation, thereby enhancing safety and efficacy far beyond conventional salts.[24,25] Despite these significant clinical and pharmacokinetic advantages—namely superior absorption and greatly reduced gastrointestinal side effects (such as constipation)—Liposomal Coral Calcium is currently underutilized in Bangladesh, where traditional calcium forms like generic carbonates and non-liposomal coral salts dominate the market. Increasing awareness and improving the accessibility of WBCIL's Liposomal Coral Calcium could significantly improve bone health management, particularly for vulnerable populations, including pregnant women and the elderly.[26,27] This study has highlighted the immense potential of this advanced product in addressing Bangladesh's public health challenge, emphasizing its clinical benefits, enhanced safety profile, and the crucial need for its broader adoption in national health and supplementation initiatives.

CONCLUSION

The calcium supplement market in Bangladesh is currently at an inflection point, having successfully transitioned from low-cost, low-bioavailability salts to the more effective Coral Calcium, which now holds a dominant sales volume share. However, to effectively combat the persistent and economically damaging national calcium deficiency burden, a leap to truly transformative delivery systems is required. Liposomal Coral Calcium, as manufactured by WBCIL, represents this necessary advancement. By offering proven superior absorption kinetics and significantly reduced gastrointestinal distress compared to both traditional carbonates and non-liposomal coral salts, it addresses the twin barriers of ineffective treatment and poor patient compliance. Widespread implementation of this highly bioavailable form would move beyond merely treating symptoms to making a strategic, long-term impact on the country's public health and economic sustainability. To realize this potential, a concerted effort is needed from public health bodies and market stakeholders to increase awareness and improve the accessibility of this cutting-edge product, ensuring that vulnerable populations, including pregnant women and the elderly, can fully benefit from its enhanced efficacy and safety profile. The future of calcium supplementation in Bangladesh hinges on the adoption of such evidence-based, high-quality, and technologically advanced solutions.

REFERENCES

1. World Health Organization. (2013). *Guideline: Calcium supplementation in pregnant women* (WHO Guideline). World Health Organization.
2. World Health Organization. (n.d.). Calcium supplementation during pregnancy to reduce the risk of pre-eclampsia (ELENA summary). WHO.
3. National Institute of Nutrition (NIN), Indian Council of Medical Research (ICMR). (2020). *Nutrient requirements and recommended dietary allowances for Indians: A report of the expert group* (RDA 2020). NIN/ICMR.
4. National Nutrition Services (NNS), Directorate General of Health Services, Government of Bangladesh. (2011). *National Nutrition Services operational plan (NNS OP) 2011–2016* (operational guidance). Ministry of Health & Family Welfare, Government of Bangladesh / UNICEF.
5. Xu, Y., Ye, J., Zhou, D., & Su, L. (2020). Research progress on applications of calcium derived from marine organisms. *Scientific Reports*, *10*, 18425. https://doi.org/10.1038/s41598-020-75575-8
6. International Osteoporosis Foundation**.** *Bone biology*. Retrieved December 3, 2025, from https://www.osteoporosis.foundation/health-professionals/about-osteoporosis/bone-biology
7. Gupta Banerjee, P., Paul, A., Mukherjee, M., Porel, A., & Pal, A. (2024). Coral calcium: A superior marine-derived calcium supplement manufactured by West Bengal Chemical Industries Ltd., Kolkata, India, for bone health and beyond.

International Journal of Pharmaceutical Research and Applications, 9(4), 1682–1687.

8. Future Market Insights. (2025). *Liposomes market: Global market analysis report – 2035*. Retrieved [date], from https://www.futuremarketinsights.com/reports/liposomes-market
9. Bromage, S., Ahmed, T., & Fawzi, W. W. (2016). Calcium Deficiency in Bangladesh: Burden and Proposed Solutions for the First 1000 Days. *Food and nutrition bulletin*, *37*(4), 475–493. https://doi.org/10.1177/0379572116652748.
10. Food Planning and Monitoring Unit (FPMU), Ministry of Food, Government of Bangladesh. (2024). *National dietary/nutrition surveillance and food security report* (FPMU report).
11. Fahim, S. M., et al. (2021). Nutrition and food security in Bangladesh: Current status and policy implications. *Food and Nutrition Bulletin / Nutrition Reviews* (review available in PubMed Central). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8687095/ .
12. Ministry of Health & Family Welfare, Government of Bangladesh. (2017). *National Guidelines for the facility-based management of children with severe acute malnutrition in Bangladesh* (3rd ed.). Ministry of Health & Family Welfare.
13. World Bank (Kakietek, J., et al.). (2018). *Supporting the National Action Plan on Nutrition: Bangladesh country brief / analysis*. World Bank.
14. Xu, Y., Ye, J., Zhou, D., & Su, L. (2020). Research progress on applications of calcium derived from marine organisms. *Scientific Reports, 10*, Article 18425. https://doi.org/10.1038/s41598-020-75575-8.
15. Ishitani, K., Itakura, H., et al. (1999). Calcium absorption from the ingestion of coral-derived foodstuffs in humans. *Journal of Nutritional Science / Clinical Nutrition* (indexed on PubMed). (Study reporting higher intestinal absorption from coral-derived calcium vs. typical calcium carbonate in a small human trial).
16. Haider, A., et al. (2012). Determination of calcium content of coral skeletons from Inani Beach, Cox's Bazar, Bangladesh. *Analytica Chimica / Marine Geochemistry* (study of Ca% in coral skeletons from Bangladesh coastal zone).
17. Jabin, Z. (2019). Different chemical forms of calcium supplementation in clinical practice. *Bangladesh Journal of Nutrition & Metabolic (BJNM)*. (Review of calcium supplement chemistry and bioavailability relevant to Bangladesh).
18. Research article: ―Calcium deficiency in Bangladesh: burden and proposed solutions for the first 1,000 days‖ (Fahim & collaborators / policy brief). (Research-policy brief analyzing prevalence of calcium deficiency and programmatic responses in Bangladesh).
19. Food and Agriculture Organization / FAOLEX. (n.d.). *National strategy on prevention and control of micronutrient malnutrition* (Bangladesh). FAO national legislation/documents repository.
20. National Health Systems Resource Centre (NHM/India). (2014). *Guidelines for calcium supplementation during pregnancy and lactation* (translated/operational guidance aligned with WHO recommendations).

21. National Institutes of Health, Office of Dietary Supplements (ODS). (2022). *Calcium — Health Professional Fact Sheet* / *Calcium: Fact Sheet for Consumers*. U.S. Department of Health & Human Services.
22. Reid, I. R., & Bolland, M. J. (2020). Calcium and/or vitamin D supplementation for the prevention of fragility fractures: Who needs it? *Nutrients*, *12*(4), 1011. https://doi.org/10.3390/nu12041011. (Critical review of benefits/risks of calcium ± vitamin D supplementation).
23. Cornwall, C. E., et al. (2021). Global declines in coral reef carbonate production and implications for marine calcium sources. *Proceedings of the National Academy of Sciences (PNAS)*, *118*(23). https://doi.org/10.1073/pnas.2015265118. (Context on sustainability of coral resources).
24. Mustari, A., et al. (2023). Coral fossil and marine calcium: potential biomedical applications and safety considerations. *Journal of Marine Biomedical Research / PMC* (open access review on coral fossil use and biological effects).
25. Bangladesh Oceanographic Research Institute (BORI). (2024). *Corals of Bangladesh: status, distribution and conservation considerations (Saint Martin's Island & Bay of Bengal)*. BORI / Government of Bangladesh technical report.
26. Gupta Banerjee, P., Paul, A., Chakraborty, A., & Kundu, S. (2025). Liposomal glutathione: A breakthrough in cellular health by West Bengal chemical industries Ltd., Kolkata, India. *The Pharma Innovation Journal*, *14*(2), 73–81.
27. Gupta Banerjee, P., Paul, A., Chakraborty, A., & Kundu, S. (2025). Liposomal calcium: A novel nutraceutical delivery approach by West Bengal chemical industries Ltd., Kolkata, India. *Acta Traditional Medicine*.
28. Bangladesh National Nutrition Council (BNNC). (2023). *Second National Plan of Action for Nutrition (NPAN-II) 2016–2025: Monitoring report*. BNNC / Government of Bangladesh.