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Is It Your Hair or Your Water?

Ms. Khwaish Kapoor

Abstract
This research paper explores the relationship between water quality, environmental conditions, and hair care concerns in the UAE. It examines how factors such as water hardness, heat, and humidity may influence hair health and consumer behaviour. A survey of 50 respondents revealed that 64% experienced frequent hair concerns, while 46% believed hard water was a major contributing factor. However, existing scientific research suggests that the relationship between water hardness and hair damage is not entirely conclusive. The study also highlights consumer needs and emerging market opportunities, emphasising the importance of informed decisions and evidence-based approaches to hair care.

Keywords: Water Hardness, Hair Care, United Arab Emirates, Environmental Factors, Hair Damage, Consumer Behaviour, Desalination, Consumer Perceptions, Market Opportunities, Hair Health.

1. Introduction: The UAE Environment and Hair Care Demand

1.1 The Local Environmental Context

The United Arab Emirates offers an interesting setting for studying hair care because the climate and water supply are so closely connected to daily routines. Hot weather, outdoor exposure and frequent washing can all influence the way people experience their hair. At the same time, many residents wonder whether the water they use at home might be contributing to dryness, dullness or breakage. These questions are worth investigating rather than simply accepting the explanations most commonly repeated online. Desalination plays a major role in the UAE's water supply [1]. However, desalinated water should not automatically be described as hard water. The mineral composition of supplied water depends on treatment and distribution, while the water reaching a household may be affected by its particular plumbing and storage arrangements. This distinction matters because a study of the UAE cannot reasonably assume that every resident is exposed to identical water conditions. It is also important to consider that hair care is rarely influenced by one factor alone. Sun exposure, styling habits, heat tools, chemical treatments, washing frequency and individual hair characteristics can overlap. An investigation that focuses only on water may overlook other explanations. The purpose of this paper is therefore not to establish water as the cause of hair problems, but to examine how environmental concerns and consumer experiences are connected. 1

1.2 Understanding Consumer Needs

When people talk about hair problems, they usually describe what they can see or feel. They may notice more strands in a hairbrush, hair that appears less shiny, or difficulty managing it after washing. These experiences are meaningful because they influence confidence, routines and purchasing decisions. Nevertheless, the description of a concern is not necessarily an explanation of what caused it. The phrase "hair fall" is a useful example. In everyday conversation, it may refer to strands breaking along their length or to hair shedding from the root. These are different processes, and evidence concerning one cannot automatically explain the other. Consumers may also use words such as "damage" and "dryness" differently, making careful definitions essential in both research and product communication. Consumer

needs can be understood in two ways. The first is practical: people want manageable, healthy-looking hair and routines that fit into everyday life. The second is informational: they want to know why a concern has appeared and whether a proposed solution is likely to help. Both dimensions are relevant to the UAE market, particularly when environmental explanations are frequently discussed but not always supported by measurements.

1.3 Research Objectives and Scope

This paper has four objectives: to examine available evidence on water hardness and hair fibres; to consider the UAE's environmental and water-supply context; to analyse reported consumer concerns using a survey of 50 participants; and to identify possible areas for further market research and consumer education. The study combines a review of published sources with descriptive analysis of an existing consumer survey. It is an exploratory investigation rather than a clinical experiment or a nationally representative assessment. Its value lies in identifying patterns and questions that deserve closer attention. The findings are discussed with these limits in mind, especially where the distinction between consumer perceptions and measured environmental conditions is important.

2. Conceptual Framework: Water Hardness and Hair Health

2.1 What Water Hardness Actually Means

Water hardness refers mainly to the concentration of dissolved calcium and magnesium. It is commonly measured in milligrams per litre as calcium carbonate equivalent. The United States Geological Survey describes water from 0 to 60 mg/L as soft, 61 to 120 mg/L as moderately hard, 121 to 180 mg/L as hard, and above 180 mg/L as very hard [2]. These categories refer to a measurable property of water, not a direct diagnosis of hair damage. Hardness should not be confused with total dissolved solids, chlorine concentration or the appearance of tap water. A household may notice an odour or residue without knowing which substance is 2

responsible. Similarly, the presence of minerals does not establish that a particular hair concern was caused by those minerals. Reliable conclusions require measurements of the relevant exposure. For research on hair, the outcome also needs to be specified. Tensile strength describes resistance to pulling forces, while elasticity, porosity and surface condition capture different characteristics. Hair shedding involves the follicle and cannot be established from experiments on detached strands. This is one reason broad claims that hard water "causes hair loss" require considerably more evidence than a general laboratory observation.

2.2 Consumer Perception and Purchasing Behaviour

A consumer's response to a problem often follows a recognisable sequence. First, they notice a change in their hair. They then try to identify a cause, search for advice, compare possible responses and judge whether the result meets their expectations. Friends, social media, advertising and previous experiences may influence this process. For example, someone who moves to a new city and notices dryness may connect the change to the local water supply. That explanation may feel convincing because the timing matches, even though weather, styling or a change in routine could also be involved. From a marketing perspective, the belief is still important: it shapes what the consumer searches for and what kinds of claims attract attention. From a research perspective, however, belief and causation must be kept separate. This distinction suggests that consumer research should ask two different questions: what problem is being experienced, and what does the person believe is causing it? The answers may overlap, but they should

not be treated as interchangeable. Understanding the desired outcome can be more useful than assuming every buyer has correctly identified the cause.

3. Environmental Conditions and Scientific Evidence

3.1 Water Supply in the UAE

The UAE relies substantially on managed water systems, including desalination [1]. This makes water quality a relevant topic for households, but national context alone cannot describe the water chemistry at every tap. Different emirates, buildings and household arrangements may have different characteristics. An appropriate investigation would measure water where respondents actually wash their hair. Dubai Electricity and Water Authority's Sustainability Report 2025 provides a total-hardness specification of 40 to 120 mg/L and a typical value of 60.7 mg/L for Jebel Ali potable water [3]. Under the USGS classification, the typical figure lies close to the boundary between soft and moderately hard water. This is an important reminder that the common description of all Dubai water as extremely hard is not supported by this particular supply figure. The figure should not be overstated in the opposite direction either. It describes a specified water supply, not every household in Dubai and not the whole UAE. A stronger study would record the 3
emirate, building type, sampling date and any household water treatment, then compare those measurements with participants' reported experiences.

3.2 Climate, Lifestyle and Other Environmental Influences

Water is only one part of the environment in which hair is exposed to daily stress. Outdoor sun exposure, humidity, washing temperature, the use of heated styling tools and chemical treatments are all relevant considerations. A 2024 study examined the effects of ultraviolet rays and particulate matter on porosity in damaged hair, illustrating why environmental research should consider more than one exposure [6]. It would be misleading to rank these influences as the leading causes of hair problems among UAE residents on the basis of the present survey. The questionnaire summary records what respondents believed, not direct measurements of exposure. Still, these factors help identify what a future investigation should include. Recording lifestyle and hair-care history alongside water measurements would allow more meaningful comparisons.

3.3 Evidence from Experimental Studies

Published studies on water hardness and hair fibre properties have not produced a completely consistent conclusion. In a 2013 experiment involving hair from 15 volunteers, researchers compared exposure to hard water at 212.5 ppm with distilled water over 30 days. They did not find a statistically significant difference in tensile strength or elasticity [4]. This result suggests that exposure to hard water does not necessarily weaken hair under every tested condition. A later study published in 2018 examined hair from 70 men and compared untreated segments with hair exposed to deionised and hard water. The hard-water group showed significantly lower tensile strength, while the deionised-water comparison did not show a significant change [5]. The difference between the studies is not a reason to dismiss either one. Instead, it highlights the importance of study design, exposure conditions and the particular outcome measured. Neither study measured the prevalence of hair shedding among UAE residents. The evidence supports a narrower conclusion: certain mineral exposures may affect certain properties of hair fibres under specific conditions. It does not establish that household water is responsible for all reported hair concerns. For a credible market study, this uncertainty should be acknowledged rather than replaced by a simple but unsupported claim. 4

4. The UAE Hair Care Market and Consumer Demand

4.1 Why Environmental Concerns Matter to the Market

The market significance of hair concerns lies not only in their possible causes, but also in how frequently people seek advice and spend time trying different routines. When a concern persists, consumers may compare everyday hair-care products, specialist services, professional advice and household water options. This creates a broad field of competing responses, even though these options do not all address the same problem. In the UAE, environmental explanations can be particularly noticeable because residents are familiar with heat and the importance of water management. However, a persuasive market story is not the same as a measured market opportunity. It is necessary to examine whether consumers actually experience recurring concerns, which benefits they prioritise, how they make decisions and what they are willing to spend. The available survey offers a starting point for this discussion, but it does not provide a reliable estimate of total national sales. A full market-size calculation would require a clearly defined product or service category, a specified year, an estimate of eligible buyers, their purchase frequency and their average expenditure. Applying percentages from 50 respondents to the UAE population would produce an unjustified level of precision.

4.2 Existing Responses and Distribution Channels

Consumer options can be grouped into routine hair care, specialist cosmetic care, professional consultation and water assessment or treatment. Routine options are often chosen for convenience and familiarity. Specialist care may be evaluated on its stated benefits and evidence. Professional advice can help distinguish cosmetic concerns from situations that require a different form of assessment. Water-related services should be judged according to actual measurements rather than assumptions. Physical retail remains useful for browsing and comparison, while online channels make it easy to research claims and read other consumers' experiences. Professional settings may offer more individual guidance. These are possible channels for reaching consumers, not verified rankings of market share. A future study could compare how people use each channel and whether their expectations are met. An important commercial consideration is the quality of information. When several competing options make similar promises, consumers may struggle to judge what is genuinely different. Clear explanations of what a claim means, how it was tested and which outcome it concerns could improve decision-making without depending on exaggerated advertising. 5

4.3 Affordability, Trust and Repeat Purchasing

Price is an important part of consumer choice, but a low price alone does not guarantee value. Consumers who repeatedly change routines without understanding the original concern may spend more over time. On the other hand, an expensive option is not necessarily more effective. Trust therefore depends partly on whether claims are specific and whether expectations are realistic. The current evidence does not measure household hair-care budgets, repeat purchase behaviour or the cost of unsuccessful trials. These questions should be included in future research. They would help distinguish people who are dissatisfied with results from those who are dissatisfied with price, accessibility or the difficulty of choosing among alternatives. A useful next step would be to ask respondents about their current routines and the changes they have made in the previous few months. Comparing those answers with stated concerns could provide a fuller picture of demand than a single question about the likelihood of trying a new product.

5. Challenges and Opportunities for the UAE Market

5.1 Challenges in Identifying the Real Problem

The central challenge is uncertainty about causation. Hair appearance and manageability can change for several reasons at the same time. If a survey only asks respondents to select the most likely explanation, it cannot establish whether that explanation is correct. This matters because decisions based on an untested assumption may not address the underlying concern. Language creates another difficulty. Words such as "hair fall", "damage" and "dryness" are familiar, but different respondents may interpret them differently. Future questionnaires should separate visible breakage, shedding, scalp discomfort and changes in shine or manageability. Doing so would make the results more meaningful and easier to compare with scientific research. The diversity of the UAE population also deserves attention. Hair texture, previous treatments, daily routines and housing conditions may vary considerably. Without individual-level information, the present survey cannot show how these factors relate to respondents' experiences. A single explanation aimed at every consumer would therefore oversimplify the market.

5.2 Opportunities for Better Consumer Information

One opportunity is to make environmental information easier to understand. Consumers should be able to distinguish between a measured water property and a possible explanation for a hair concern. Information should also explain the difference between hair fibre damage and shedding from the root, rather than using the two ideas interchangeably. A second opportunity is to focus research on clearly defined benefits. Shine, ease of combing, perceived dryness and hair shedding are not identical outcomes. They require different forms of evaluation. Consumer satisfaction is valuable, but it should be reported separately from objective measurements so that the strength of each claim remains clear. 6

Finally, there is room for locally relevant evidence. Research that combines household water testing with structured questionnaires and follow-up observations could provide stronger guidance than surveys of opinion alone. Such research would be especially useful if it included respondents from more than one emirate and different housing arrangements.

6. Survey Findings and Consumer Analysis

6.1 Research Method and Respondent Overview

The survey component draws on an existing summary of responses from 50 participants [8]. The questions explored how frequently people experienced hair concerns, what they believed contributed to those concerns and which improvements they wanted most. The results are descriptive and relate to this group of respondents, not to the entire UAE population. Because the analysis uses the available aggregate summary, it is not possible to examine individual combinations of answers. For example, the results cannot show whether the same respondents who identified water as a concern also reported the highest frequency of problems. This is a limitation of the data, rather than evidence that no such relationship exists.

6.2 Frequency of Hair Concerns

Among the 50 respondents, 48% reported experiencing hair concerns very often and 16% often. A further 22% selected sometimes, while 12% selected rarely and 2% never. In other words, 32 of the 50 participants, or 64%, reported concerns often or very often. This pattern suggests that hair care is a recurring issue for a considerable share of the surveyed group. It does not tell us how severe those concerns were or whether they involved the same symptoms. Nevertheless, the high frequency of reported dissatisfaction provides a useful reason to investigate consumer needs more closely. Frequency |

Respondents | Share Very often | 24 | 48% Often | 8 | 16% Sometimes | 11 | 22% Rarely | 6 | 12% Frequency | Respondents | Share Never | 1 | 2% 7

6.3 Perceived Causes of Hair Concerns

When asked about the main perceived cause, 46% selected hard water, making it the most common response. Stress or lifestyle was selected by 22%, climate by 20%, diet or health by 8%, and chemical styling by the remaining 4%. These figures correspond to 23, 11, 10, 4 and 2 respondents respectively. The prominence of water is significant for understanding consumer attitudes. Almost half the sample associated their concerns with water, which may influence what information they search for and which solutions they consider. However, the result measures what respondents believe. It does not demonstrate that 46% of households have hard water or that water caused 46% of the reported concerns. Perceived cause | Respondents | Share Hard water | 23 | 46% Stress or lifestyle | 11 | 22% Climate | 10 | 20% Diet or health | 4 | 8% Chemical styling | 2 | 4%

6.4 Desired Improvements and Consumer Priorities

Reducing hair fall was the most frequently selected benefit, chosen by 70% of respondents. Improving shine followed at 52%, while 36% wanted a healthier appearance and 34% prioritised hydration. These responses correspond to 35, 26, 18 and 17 participants respectively. The totals exceed 100% because participants could select more than one benefit. This is meaningful: people often want several improvements at once, rather than one isolated result. The responses suggest that concerns about hair fall are especially prominent in this sample, but appearance and manageability also matter. The survey findings also demonstrate why consumer preferences should be studied separately from suspected causes. Someone who believes water is responsible for a problem may still primarily want greater shine or less breakage. A useful response begins by defining the outcome rather than assuming the explanation. Desired benefit | Respondents | Share Reduced hair fall | 35 | 70% Improved shine | 26 | 52% Healthier appearance | 18 | 36% Hydration | 17 | 34% 8

6.5 Interpretation of the Overall Findings

Taken together, the findings suggest a gap between the frequency of hair concerns and certainty about their causes. Many respondents report recurring problems, and water is the leading perceived explanation. Yet the survey cannot establish a direct connection between household water chemistry and the concerns reported. From a market perspective, this gap points to a need for practical guidance and clearer communication. From a research perspective, it shows why household measurements and more detailed questions would be valuable. The most responsible interpretation is that the survey identifies consumer priorities and beliefs, not verified medical or environmental causes.

7. Discussion: Implications for Consumers and the Market

7.1 The Importance of Evidence-Based Communication

One of the clearest lessons from this investigation is that a convincing explanation is not always a proven explanation. Environmental factors are easy to discuss because they are familiar and visible, but they should not be used as a substitute for testing. Consumers benefit when claims explain exactly what was measured and what conclusion the evidence supports. This approach can also improve competition. Rather than relying on broad promises about “repairing damage”, organisations could distinguish between outcomes such as smoother hair, easier detangling or changes in tensile strength. Precise language gives consumers a more realistic basis for comparison.

7.2 Directions for Future Research

A stronger follow-up study would recruit participants across different emirates and housing types, document recruitment and survey dates, and collect individual-level responses. It would also measure water hardness at the household tap and record relevant factors such as washing frequency, heat styling, chemical treatments and time spent outdoors. Questions should distinguish between hair breakage and shedding, while observations over time could help identify whether concerns change alongside routines or measured exposures. This would not remove every source of uncertainty, but it would provide a much stronger basis for examining relationships than perceptions alone. Future market research could also measure current expenditure, reasons for switching products or services, and repeat purchasing. These questions would help estimate demand more realistically and identify which problems consumers find most difficult to solve. 9

7.3 Wider Social and Environmental Considerations

Better information can have value beyond individual purchasing decisions. When consumers understand what a test or claim actually shows, they may be better equipped to avoid unnecessary trial and error. The present study does not calculate financial savings, but it identifies a plausible reason why transparent information matters. Environmental considerations should also be treated carefully. Additional washing, packaging and household treatment equipment can carry resource costs. In a country where desalination is an important part of the water supply, it is particularly important not to assume that every proposed response to an environmental concern is automatically sustainable [1]. 10

8. Conclusion

This investigation began with a simple question: is the problem the hair, the water, or a combination of factors that has not yet been fully understood? The evidence suggests that there is no single answer that can be applied to every household or every individual. Hair concerns are influenced by a range of experiences, and the cause of a visible problem cannot always be identified through observation alone. The survey of 50 participants showed that 64% experienced hair concerns often or very often, while 46% considered hard water their main possible cause. Reduced hair fall and improved shine were the most commonly desired outcomes. These findings show that the concerns are important to the respondents, but they do not prove that water hardness caused them. The scientific literature also calls for a careful interpretation. Experimental findings on hard water and hair strength differ, and official supply information does not support describing all UAE water as uniformly hard. The strongest conclusion is therefore not that one environmental factor explains everything, but that the relationship deserves more precise, locally relevant research. For consumers and businesses alike, the way forward is to focus on specific needs, measurable evidence and clear explanations. Household water testing, better-designed surveys and a more careful distinction between breakage and shedding could make future conclusions more useful. Ultimately, understanding what people experience is the first step; understanding why it happens requires further investigation. 11

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