WHITEPAPER

Acne Demographics and Microbiome Insights

LabSkin

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Acne Prevalence and Demographics in Western Markets

Acne vulgaris is one of the most prevalent dermatological conditions worldwide, affecting a significant portion of the population in both adolescence and adulthood. Acne rates have been rising since the 1990s, with Western Europe identified as having the highest prevalence among world regions [1]. High-income, industrialised regions (including Europe and North America) report the greatest acne burden, likely due to lifestyle factors such as diet and urban environment [2]. The United States, for example, is estimated to have about 50 million people affected by acne at any given time.[2]

Age trends: Over 85 percent of teenagers (ages 12 to 19) experience some form of acne [2], with prevalence peaking in the mid to late teens. The highest incidence is typically observed in 15- to 19-year-olds [1]. Interestingly, the age of onset appears to be creeping earlier with the fastest growth in acne cases recently seen in the 10- to 14-year-old group [2]. While acne often improves after the early twenties, it remains common in adults. Epidemiological studies confirm that acne's persistence into adulthood is increasing, particularly in women [2]. Around 20 percent of acne cases are adult onset occurring after age 25, and many adolescent cases continue into the thirties [3].

Gender differences: There is a notable gender shift in acne prevalence from the teen years into adulthood. During adolescence, boys often experience more severe acne due to androgen driven sebum production, some surveys find adolescent acne slightly more common in males than females [4]. By adulthood, the trend reverses predominantly becoming a female concern. One United States study found that in the 20 to 29 age group, 51 percent of women reported having acne, compared to 43 percent of men [3]. This female majority widens with age. By the forties, women are far more likely than men to suffer persistent breakouts. Hormonal fluctuations including menstrual cycles, pregnancy, and polycystic ovary syndrome are thought to contribute to this sustained acne in adult women [3].

Acne prevalence also shows some ethnic and regional variation. Some studies suggest acne can be equally or more prevalent in individuals with darker skin types, for instance, one survey reported acne in 37% of African American women vs 24% of Caucasian women [4], though the presentation (e.g. post-inflammatory hyperpigmentation) may differ. Additionally, urbanisation and "Western" diets (high glycemic load and dairy) have been correlated with higher acne rates.

The takeaway for Research and Development (R&D) professionals is that acne is not merely a teenage rite of passage; it is a widespread, chronic condition across age groups and geographies, with an increasing population of adult sufferers in Europe and North America. This shifting epidemiology drives a strong demand for new acne solutions that cater to adults as well as adolescents [2].

Acne Prevalence and the Skin Microbiome

Beyond hormones and genetics, science has turned to the skin microbiome as a key to understanding acne. The skin's microbiota plays a crucial role in skin health and disease. Acne is associated with a disruption in this microbial community. Data provided by Labskin's Skin Trust Club comparing microbiome composition in normal versus acne prone skin illustrate some striking differences. For example, Cutibacterium acnes (previously classed as Propionibacterium acnes) shows a significant shift in abundance between healthy and acneic skin (Figure 1). Acne samples showed an even greater prevalence of C. acnes on average. This aligns with the known association of C. acnes with acne, triggering inflammation and comedones when the microenvironment becomes imbalanced.
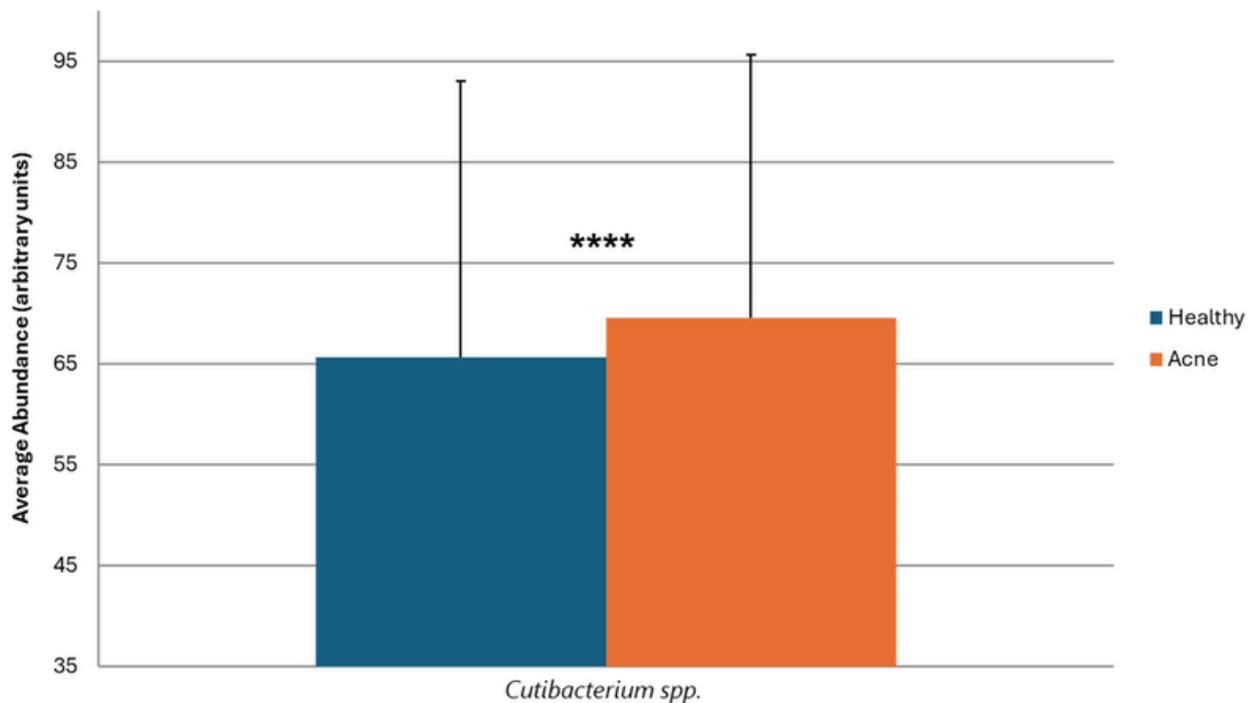

Figure 1 – Relative abundance of Cutibacterium spp. in Healthy (n=2960) vs Acne (n=2249) prone skin. Errors bars represent standard deviation (negative error bars removed for clarity). **** p <0.001.

However, the role of the microbiome in acne is more nuanced than simply an excess of bacteria. C. acnes is a normal resident on virtually everyone's skin, and simply having a high abundance does not always equate to breakouts. Research suggests that which strains of C. acnes are present and how the host immune system reacts to them is the critical factor.[7] Labskin ltd analyses reinforce this: Cutibacterium spp. can be high in one person without causing acne, yet in another it contributes to breakouts. The difference lies in the broader microbial balance and strain specific behaviours. C. acnes is not purely a foe; it also produces beneficial metabolites and is part of the normal skin ecosystem.
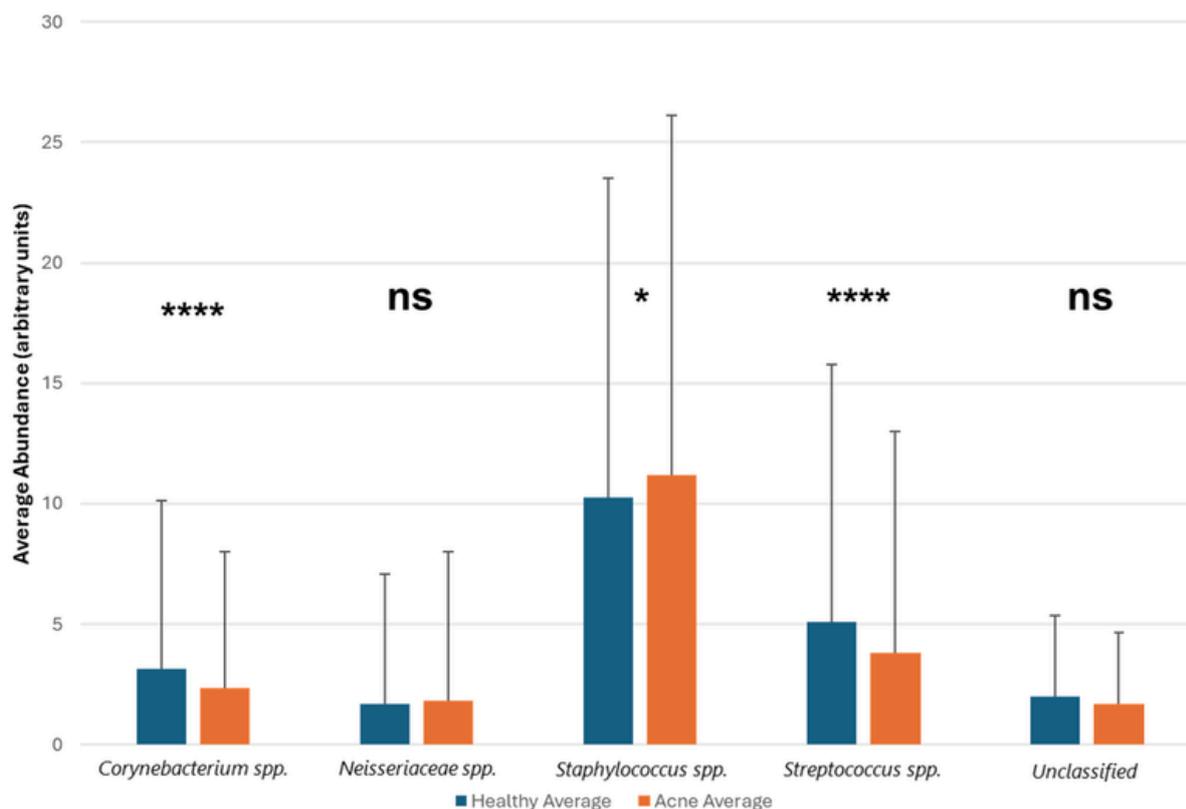

Figure 2 – Relative abundance of Corynebacterium spp., Neisseriaceae spp., Staphylococcus spp., Streptococcus spp., and low abundance "Unclassified", in Healthy (n=2960) vs Acne (n=2249) prone skin. Errors bars represent standard deviation (negative error bars removed for clarity). * p<0.05, **** p <0.001.

Beyond the key players, several other bacterial genera show meaningful trends in the Skin Trust Club dataset. For example, the relative abundance of Corynebacterium spp.is notably lower in acne affected skin (Figure 2). These microbes are often associated with healthy skin and may contribute to microbial stability. In contrast, acne prone skin shows a higher prevalence of opportunistic bacteria such as Micrococcus spp. and Enhydrobacter spp. While not traditionally linked to acne pathogenesis, their increased presence suggests they may thrive in inflamed or disrupted environments, potentially worsening the condition or acting as secondary contributors.

Acne affected skin also tends to display greater microbial diversity compared to healthy skin, which is often dominated by C. acnes. Acne lesions, on the other hand, reveal a more varied microbial community, including organisms such as Lactococcus garvieae, Stenotrophomonas spp., Achromobacter spp. and Pseudomonasspp., microbes typically absent from healthy skin [5].

Meanwhile, beneficial commensals like Staphylococcus epidermidis, known for producing anti-inflammatory compounds, may be reduced. The shifting balance and complex interplay between C. acnes and Staphylococcus spp. remains a central focus in acne microbiome research [6]. Understanding these broader changes in lesser studied species helps build a fuller picture of microbial imbalance and may offer new targets for skincare interventions aimed at restoring a healthier skin ecosystem.

Summary

In summary, the microbiome of acne skin is distinct: dominated by C. acnes but often with different strains and a disturbed supporting cast of microbes. For R&D teams, these insights support new strategies including targeted probiotics, prebiotics, and antimicrobial agents that selectively inhibit harmful strains without disrupting the overall flora. The goal is not to sterilise the skin, but to recalibrate the microbiome to a healthy state.

Labskin's In Vitro Skin Model Supporting Acne R&D

Labskin provides a practical bridge between these scientific insights and product development. As a company specialising in biotechnology for skin health, Labskin offers in vitro human skin platform and microbiology services that enable cosmetic, skincare, and personal care R&D teams to innovate faster, smarter and ultimately more cost effectively.

Lab Grown Human Skin Model: At the core of Labskin's offerings is a laboratory grown three-dimensional human skin model. This model can be colonised with bespoke microbiome consortia to mimic acne prone skin. R&D professionals can apply topical formulations or treatments to these living skin models to observe effects on the skin model barrier, its immune response and the colonising microbes. This includes leave on and rinse off formulations. Labskin's model allows testing of product impact on the skin microbiome without involving human subjects. This is especially valuable for verifying that a product targets harmful C. acnes strains while preserving beneficial bacteria.

Microbiome Analysis and Data Services: Labskin pairs its skin model with microbiology and analytics capabilities. Through the Skin Trust Club platform, Labskin has assembled one of the largest skin microbiome databases. We use next generation DNA sequencing to identify and quantify bacterial species on skin. R&D teams can perform microbiome profiling to see how formulations affect the bacterial community. The Labskin scientists can assist in identifying microbial biomarkers of acne and testing how ingredients influence them.

Personalised Skincare Development: Labskin is advancing personalised skincare by linking consumer microbiome data to R&D. Skin Trust Club provides individualised microbiome readouts, which inform product development. Labskin's AI can stratify acne sufferers by microbiome profile, supporting targeted product design and validation on the in vitro skin model.

Product Efficacy and Safety Validation: Labskin's services also provide robust in vitro product testing before clinical trials. The Labskin model is an ethical alternative to animal testing. Companies can evaluate an acne treatment's performance on the model under reproducible conditions.

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Conclusion

Acne remains a widespread concern in Europe and the UK, affecting adolescents and adults alike. The demographic trends and evolving microbiome science are reshaping how companies approach acne care. Products must do more than kill bacteria; they must restore skin balance. Labskin's advanced skin model and microbiology services provide the tools needed to meet these demands. By integrating Labskin's platform into their research pipeline, R&D teams can develop effective, microbiome friendly skincare innovations that align with current scientific understanding and consumer expectations.

Key Takeaways for Acne R&D and Product Innovation

- **Acne is a lifelong condition, not just a teenage concern**

Prevalence remains high into adulthood, particularly among women in Europe and North America, creating sustained demand for effective long-term acne solutions.

- **Western lifestyles are linked to higher acne burden**

Urbanisation, diet, and environmental factors correlate with increased acne prevalence in high-income regions, reinforcing the need for regionally relevant product development.

- **Acne is a microbiome imbalance, not a single-pathogen disease**

While Cutibacterium acnes is central to acne, its role depends on strain diversity, host response, and the surrounding microbial ecosystem rather than simple overgrowth.

- **Healthy skin relies on microbial balance, not bacterial elimination**

Acne-prone skin shows reduced beneficial commensals and increased opportunistic species, supporting strategies that rebalance rather than sterilise the skin.

- **Microbial diversity and strain specificity offer new intervention targets**

Differences in supporting bacterial communities present opportunities for targeted prebiotic, probiotic, and selective antimicrobial approaches.

- **Next-generation acne products must be microbiome-friendly**

Effective solutions should suppress pathogenic activity while preserving beneficial microbes and skin barrier function.

- **In vitro human skin models accelerate ethical, predictive R&D**

Labskin's colonised skin models allow controlled, human-relevant testing of formulations without animal or early-stage clinical trials.

- **Microbiome data enables smarter, more personalised acne innovation**

Linking microbiome profiling, AI-driven stratification, and in vitro validation supports precision skincare development aligned with emerging consumer expectations.

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