

Lazy Eight Research

September, 2026

Skin Spectrum

Designing for continuous human variation

Skin Spectrum began inside client work across beauty and colour products. We are publishing the framework because the underlying problem is shared: human skin behaves as a continuous system, while products, shelves, images, and algorithms still need discrete decisions.

India makes the limits of a single-palette model unusually visible. Substantial internal variation sits inside one large and fast-changing beauty market, while the evidence remains partial, locally bounded, and methodologically uneven. That makes India a valuable lead design environment, provided local people are research partners rather than a test population.

Research brief	01	02
One spectrum. Two operating questions.	Building in India How can an Indian beauty team turn local variation into sharper research, shade architecture, testing, retail education, and structured feedback?	Entering India How can an international team bring its product system into India without treating a global range as a complete local answer?

The Category Is Not the Person

Categories are necessary. A manufacturer cannot make an infinite inventory. A retailer needs a shelf. A clinician needs a repeatable description. A person choosing a product needs language that is faster than a spectrophotometer. The problem is not compression itself. The problem begins when a category designed for one decision is mistaken for the underlying reality, then carried into another decision where it no longer fits.

Fitzpatrick phototypes, for example, were built around response to ultraviolet exposure, especially burning and tanning. They are still routinely used as if they were a universal map of visible colour or ethnicity. Visual tone scales can be useful for representation and annotation, but the judgement is affected by the image, the light, the observer, and the social context. Instrument readings are more controlled, but they remain readings of a particular body site, at a particular moment, under specified conditions.

In this research note, skin spectrum means the continuous and context-dependent variation in how human skin is composed, reflects light, is perceived, is represented, and interacts with products. It is a design model, not a new biological law and not a more elegant name for a light-to-dark line.

Sources: [1] [2] [3].

Skin Is a Living Optical System

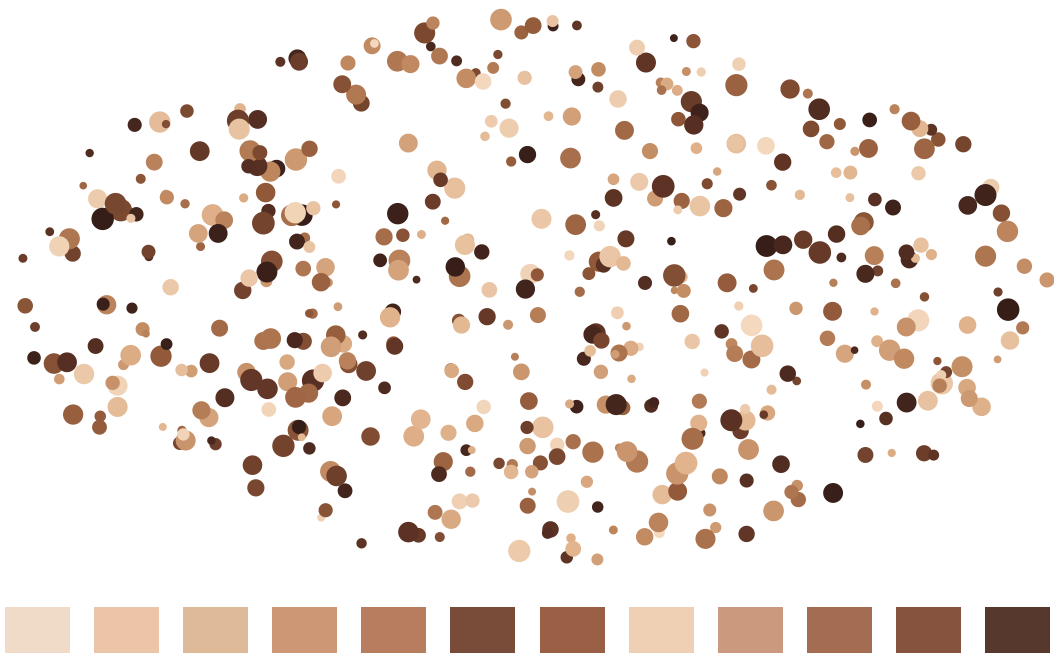
Visible skin colour is not a coat of paint laid over the body. It is an optical event produced by pigments, blood, tissue, surface, light, and observation.

Melanin is produced in melanosomes inside melanocytes and transferred into neighbouring keratinocytes. People have broadly similar melanocyte counts at a given body site, while melanin production, melanosome size, distribution, and processing differ. Eumelanin and pheomelanin contribute differently to pigmentation and photoprotection. Haemoglobin, carotenoids, oxygenation, tissue thickness, hydration, surface oil, inflammation, and scattering also alter what reaches the eye.

The result is spatial as well as personal. A face, inner arm, outer arm, lips, under-eye area, scar, freckle, tan, and patch of hyperpigmentation do not resolve to one stable colour. A 2026 preprint using optical modelling describes measured human skin colours as following a curved locus in CIELAB space, shaped substantially by melanin and blood, rather than a straight beige-to-brown path. That work should be read as a useful optical model, not settled consensus.

A shade is one observation of the system under defined conditions.

Sources: [\[4\]](#) [\[5\]](#).



Illustrative palette. Not a population sample or a product coverage test.

A person is not a swatch.

Even before a product enters the picture, skin varies across a face, across a body and over time.

A shelf needs a decision.

A product range has to make choices. It turns an open-ended problem into a finite set of things people can make, stock and choose.

The person stays complex.

The names help us navigate that range. They cannot tell us everything about a person, or promise how a product will look and wear.

India is revealing because multiple sources of variation overlap inside one vast product environment. It is not evidence for a claim that India contains the world's widest skin-colour range. The available Indian studies are partial, use different constructs, and do not form a nationally representative atlas. Their value is more precise: even within bounded samples, a single Indian tone quickly becomes untenable.

Three studies offer three partial windows. They should stay separate because clinical complexion categories, CIELAB coordinates, and a Melanin Index do not measure the same thing and cannot be converted directly into one another.

Instrumental Colour Coordinates

Delhi CIELAB

L* L* 24.98 to 51.62

a* a* 4.61 to 17.16

b* b* 20.16 to 34.83

Measured on the volar upper arm of 714 healthy participants in Delhi. Each range is marginal. Its endpoints must not be combined into synthetic observations the study did not record.

Sources: [6]

Reflectance-Derived Index

North Indian Melanin Index

17.93 to 56.92

Measurements across six North Indian populations show substantial variation within a bounded region. Body site and study population matter. This is not a national interval and it is not a CIELAB conversion.

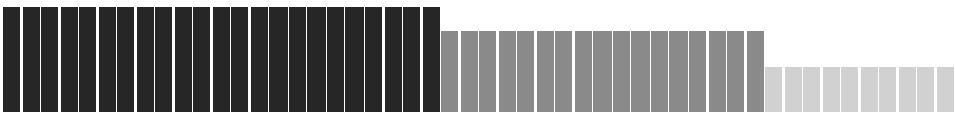
Sources: [7]

Clinical Categories

Four-City Clinical Distributions

1,204 women

Mumbai



wheatish 45 percent · medium brown 34 percent · remaining 21 percent

Delhi



brown 41 percent · medium brown 34 percent · remaining 25 percent

Kolkata



medium brown 39 percent · brown 37 percent · remaining 24 percent

Chennai



brown 38 percent · dark brown 36 percent · remaining 26 percent

The category names are the study's clinical terms, reproduced to describe its method. They are not endorsed here as a product taxonomy. Each row shows the two leading categories and combines all other classifications as remaining.

Sources: [8]

Movement Followed by Boundaries

A tempting explanation would draw India as a simple latitude gradient, light in the north and dark in the south, then call geography the cause. That picture is too neat. Population history in South Asia includes several deep ancestral sources, widespread mixture, later movement, local selection, founder effects, drift, and gene flow. In many groups, periods of mixture were followed by increasingly strong endogamy. Social boundaries became biological structure over generations without turning people into pure or timeless types.

Pigmentation-associated variants including SLC24A5, TYR, and SLC45A2 contribute to visible differences, but no single variant explains a person or the region. Research across sampled Indian populations suggests that population structure and social factors can be stronger predictors of pigmentation variation than ultraviolet exposure alone. Geography matters. It is one force among migration, selection, endogamy, culture, and environment.

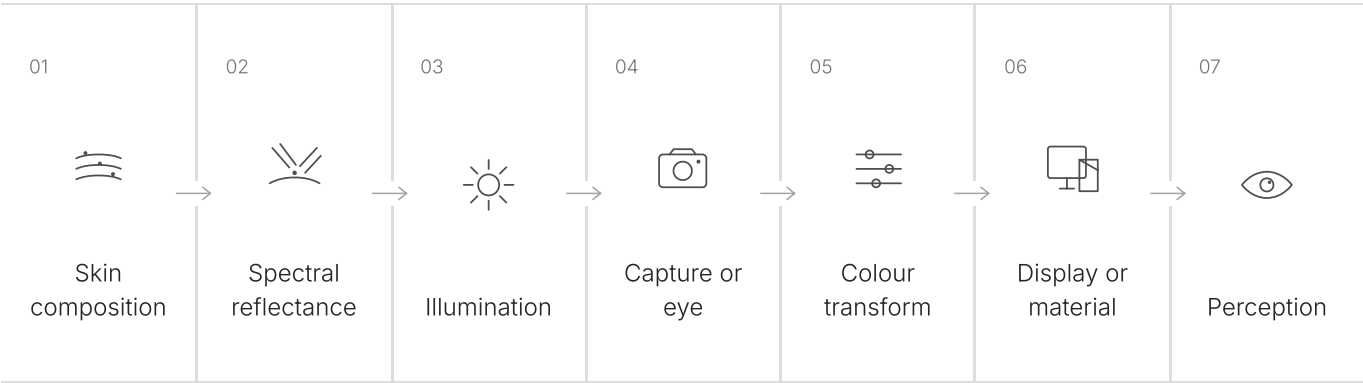
The responsible image is therefore not a map that colours northern India light and southern India dark. It is a mosaic with overlapping histories and porous edges, followed in places by boundaries that became unusually durable.

Sources: [9] [10] [11].

Every Colour Is Translated

There is no context-free skin colour. The light that leaves skin depends on its spectral reflectance and the illumination falling on it. An eye adapts to the surrounding light and judges colour relative to nearby colours. An instrument reduces measured light to coordinates using a specified illuminant and standard observer. Its strength is controlled comparison, not the discovery of an eternal hex code.

Visible Color Translation Chain



Photography inserts a sensor, exposure, white balance, tone mapping, colour correction, and compression into the chain. Display adds a colour space, gamut, white point, brightness, and viewing environment. sRGB remains the default web reference in many contexts, while wider-gamut spaces can encode colours that sRGB cannot. A product adds another translation: wet to dry, screen to pigment, compact to face, or printed lens to living iris.

Every arrow is a design decision or a source of uncertainty.

Sources: [12] [13] [14].

India as a High-Resolution Test Environment

India combines three useful conditions for cosmetics teams: substantial internal variation, growing beauty demand and launch infrastructure, and product pressure across climate, price, format, retail channel, language, matching systems, and intended effect. Together, these conditions make India a potentially high-resolution environment for discovering where a product model compresses too much.

That is an editorial inference, not a published scientific conclusion. It does not mean that success in India guarantees universal performance, or that Indian consumers should become a test population for products designed elsewhere. It means India can be treated as a lead design environment: a place where local research, local product authority, and rigorous testing can reveal failures before a global range is mistaken for a global answer.

Published market signal

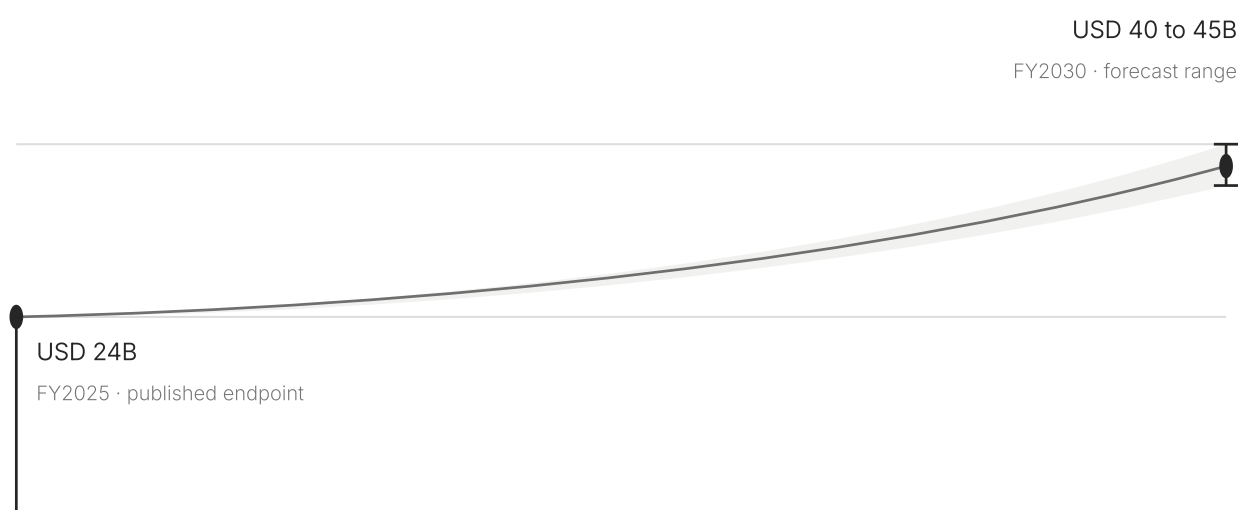
A larger test environment

Nykaa's FY2024-25 integrated report, citing Redseer, places India's beauty and personal care market at approximately USD 24 billion in FY2025 and projects USD 40 to 45 billion in FY2030.

The same report projects India's FY2025 to FY2030 market growth at 10 to 12 percent, ahead of the comparison markets it lists. That is a demand signal, not evidence of inclusive product performance.

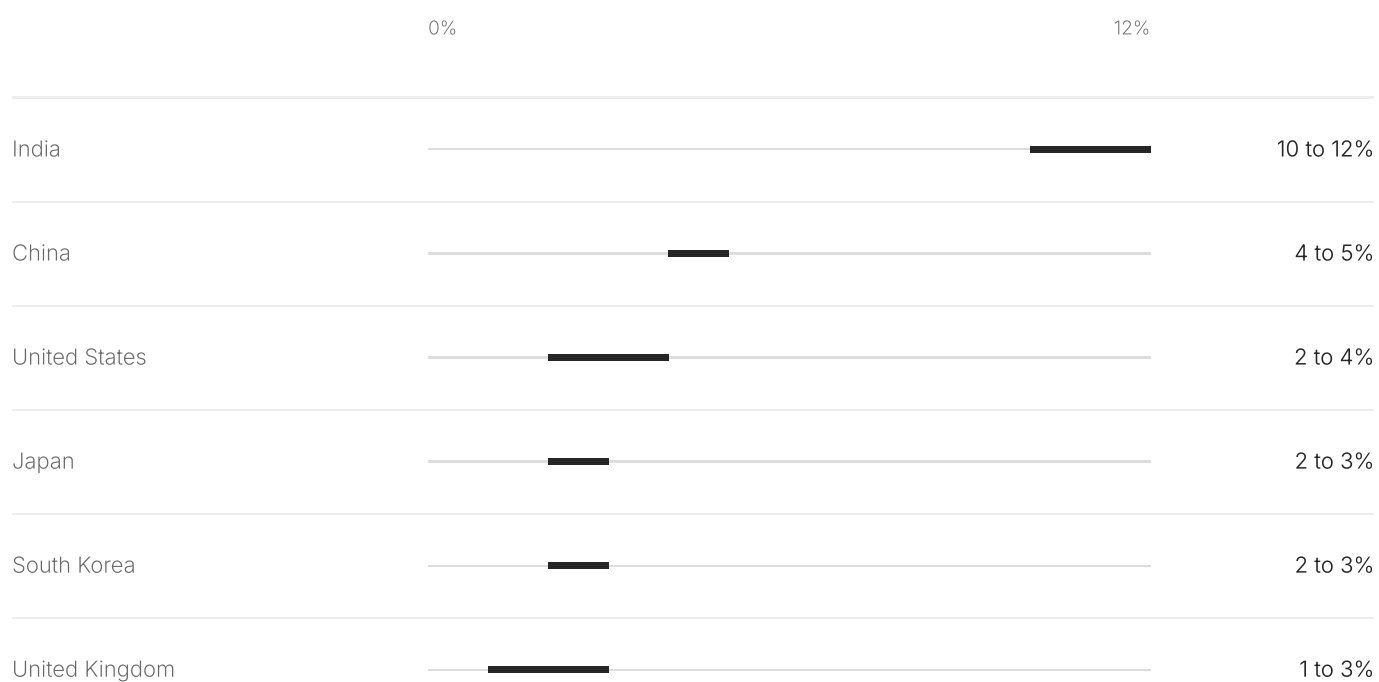
Sources: [\[15\]](#)

FY2025 24B estimated market	FY2030 40 to 45B forecast range	FY25 to FY30 10 to 12% India BPC CAGR
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Published endpoints only. The pale field connects FY2025 to the FY2030 forecast interval; it does not imply annual estimates.

India has the highest published growth range in this comparison



Shade Count Is Not Coverage

More shades can create more opportunities to match, but the headline count cannot tell us where those shades sit, which undertones they attempt to address, what is stocked in India, whether adjacent formats use the same architecture, or how the product behaves after application. A range can be globally long and locally sparse. It can cover the middle densely and leave meaningful intervals at either edge. It can offer a well-resolved liquid while compressing the same users into a handful of powder, cushion, serum, or sunscreen options.

Research interpretation: Current strategies can be read in several broad modes: India-first shade architecture from brands such as Kay Beauty and SUGAR; localised global ranges such as Maybelline India; global range expansion associated with M.A.C, Fenty Beauty, and Estée Lauder; adaptive matching and diagnostic tools from companies including L'Oréal and Lancôme; and portfolio compression, where the range narrows as it moves across formats. These modes can overlap. They describe routes to the market, not a ranking of brands or a published classification.

One brand is rarely one spectrum

Counts are dated storefront observations and do not prove coverage. Recorded on 10 August 2026.

Kay Beauty	Maybelline India
hydrating foundation 20 [16]	Fit Me liquid 18 [20]
cushion 16 [17]	powder foundation 6 [21]
soft matte 15 [18]	
tinted sunscreen 8 [19]	

Lakme Hya Matte 20 [22] cushion 12 [23] tinted serum 4 [24]	SUGAR Ace of Face foundation stick [25] is retained as a qualitative example. Its current official page does not publish a total shade count, so it is excluded from the numeric comparison.
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Storefront observations were recorded on 10 August 2026. The headline liquid ranges for Kay Beauty [16] , Maybelline India [20] , and Lakme [22] were rechecked on 3 September 2026. The current SUGAR [25] page does not publish a total, so it is not included in the numeric comparison. Availability and counts can change.

A useful coverage question begins after counting: how are the shades distributed across depth and undertone? Which products share a matching system? Which shades reach Indian shelves and channels? Does the match remain stable after drying, oxidation, oil, heat, humidity, and changes in illumination? Does a tinted mineral sunscreen leave a visible cast? Can a shade finder explain its uncertainty when the input is an uncontrolled phone image?

The commercial opportunity is not infinite inventory. It is continuous measurement paired with discrete inventory, with the variables chosen according to performance. The answer might be a better interval, a modular adjuster, an adaptive recommendation, a published performance envelope, or a feedback loop that records mismatch reasons instead of merely recording a return.

Product evidence: [26] [27] . These studies are not India-specific and support product mechanisms, not claims about Indian consumer outcomes.

An international cosmetics team can turn the spectrum from an aspiration into an operating review. The audit below does not award an inclusivity score. It makes the compression visible, names the evidence needed, and creates a place for local teams and customers to challenge the assumptions behind a range.

Ten questions for an India cosmetics launch

Review	Question	Evidence to retain
01 · global range	What is the full architecture beyond shade count?	Shade coordinates, depth intervals, undertone logic, formulation families.
02 · India-stocked range	What products and shades are available in India?	SKU, channel, city, price, stock, launch date.
03 · missing depth and undertone intervals	Where do measurements and match failures reveal gaps?	Measurements, expert review, mismatch reasons, lost-sale evidence.
04 · undertone distribution	Is this undertone model measurable and useful?	Definition, reliability, wearer evaluation, performance.
05 · format parity	Does shade coverage hold across formats?	Cross-format shade map, compression rationale.
06 · climate and wear testing	How does performance change under local wear conditions?	Protocol, timed change, failure threshold, participant context.
07 · shade-finder method	What informs each recommendation, and how certain is it?	Lighting, device controls, calibration, coverage, confidence, fallback.
08 · retail education	Can staff explain matching without ethnic shortcuts?	Training, decision aids, assisted-match notes, escalation.
09 · mismatch feedback	Does every mismatch become structured evidence?	Returns, reason codes, lighting, wearer language, resolution.
10 · price and channel access	Can customers access suitable options at the promised price?	Price ladder, channels, geography, recurring stock gaps.

What Still Needs to Be Measured?

Which dimensions of undertone can be measured reproducibly and predict product preference or performance?

Which body site should each product category use for measurement?

Which failures come from coverage, and which come from formulation, merchandising, education, or access?

Can spectrum-led systems become more precise without becoming invasive, extractive, or exclusionary?

How much pigmentation variation across India has been measured with nationally representative, calibrated methods?

How stable are measurements across season, sun exposure, inflammation, and hormonal change?

For cosmetic lenses, which variables best predict perceived naturalness, intended effect, comfort, and satisfaction?

The spectrum is not the inventory. It is the reality the inventory has to answer to.

When a Colour Product Meets a Body

A cosmetic contact lens makes the framework unusually visible. Pigment pattern, opacity, hue, print density and radial geometry meet an existing iris, changing pupil, tear film, whole face, surrounding light and intended effect. The same named lens can therefore be read differently across wearers and conditions, which makes observed wear and calibrated simulation more useful than an isolated product swatch.

Aesthetic personalisation remains subordinate to professional fitting, optical quality, material safety, pigment enclosure, comfort and the regulatory treatment of the product in each market.

Sources: [\[28\]](#) [\[29\]](#) [\[30\]](#). Product-specific Indian classification and licensing for non-corrective cosmetic coloured lenses remains to be confirmed before publication.

Sources

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18. [Kay Beauty, soft matte full coverage foundation](#)
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21. [Maybelline India, Fit Me powder foundation](#)
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23. [Lakme, 9to5 Hya Beach Edit cushion foundation](#)
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