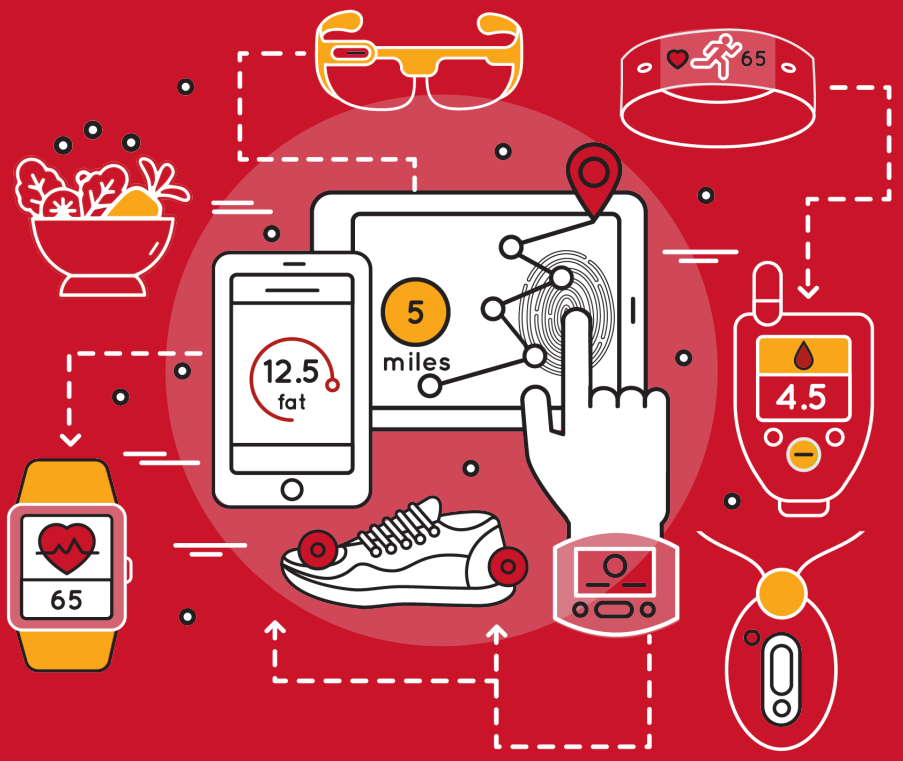
ADITYA BIRLA CAPITAL
HEALTH INSURANCE

Unlocking Health Trajectories:

Real-World Biomarker Trends from Insured Indian Populations



ABHI Purpose –
Empowering people to lead healthier lives

India's transition toward preventive and data-driven healthcare—aligned with the Ayushman Bharat Digital Mission (ABDM) and the long-term vision of Universal Health Coverage for Viksit Bharat by 2047—calls for longitudinal, real-world health evidence beyond episodic clinical encounters. Aditya Birla Health Insurance (ABHI), by virtue of sustained engagement with insured populations, is well positioned to support this shift.

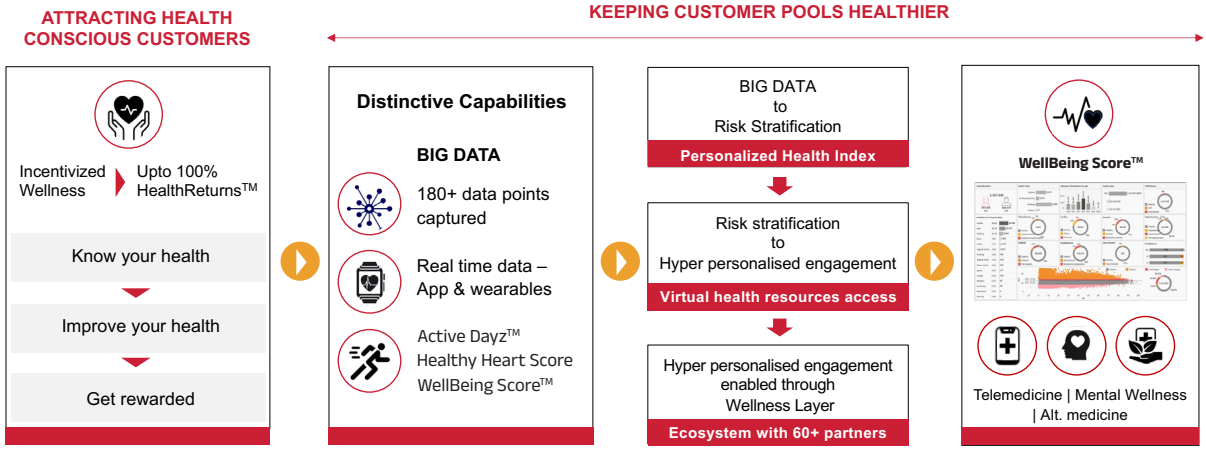
ABHI operates on a health-first insurance model anchored in an integrated Know Your Health – Improve Your Health – Get Rewarded and stay protected approach. The model emphasizes early risk identification through continuous biomarker and lifestyle data capture, enabling individuals to understand their health status and receive ongoing support through digital engagement, wellness programs, and structured interventions. A core component of this framework is ABHI's proprietary Wellbeing Score™, which facilitates periodic risk stratification and reclassification using repeated biomarker measurements across the customer lifecycle.

ABHI's Health First Tenets[1]



This ecosystem allows the analysis of temporal health trajectories rather than cross-sectional snapshots. The present study leverages this longitudinal capability to examine real-world biomarker trends among insured individuals and benchmark them against national datasets, demonstrating how ABHI-generated data can contribute to preventive health strategies and policy-relevant insights. This approach is aligned with ABHI's stated purpose: "Empowering people to lead healthier lives."

ABHI's Health First Model in Action

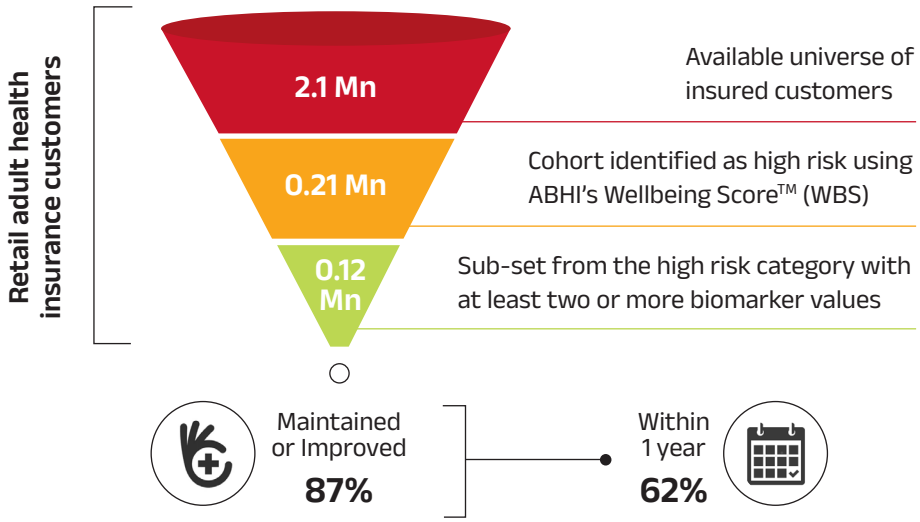


[1]ABHI's Health-First Model redefines insurance by shifting from reactive claims management to a proactive, data-driven health ecosystem. It attracts health conscious customers through incentivized wellness programs (up to 100% HealthReturns™) and continuously captures 180+ real-time data points via apps and wearables to generate dynamic health metrics like the WellBeing Score™ (WBS). Using proprietary machine learning-based risk stratification, customers are mapped to a WBS, enabling hyper-personalized interventions, targeted engagement, and access to a broad ecosystem of partners offering services such as telemedicine and mental wellness. This closed-loop model—combining data, personalization, and continuous engagement—not only improves individual health outcomes but also builds a healthier, lower-risk customer pool, driving long-term sustainability for the insurer.

Abstract

We present one of the first large-scale analyses of longitudinal health data from over 2.1 million retail insured adults across India, using real-world insurance-linked health records. Approximately 56% of the high-risk population* had two or more biomarkers, enabling temporal trend analysis. Of these, 87% either maintained or improved their health status, with nearly 62% showing measurable biomarker improvement within a year.

These findings have significant implications for India's preventive care strategies, actuarial modeling, and value-based insurance design. By benchmarking biomarker trends against population-level disease burden as identified through national surveys like National Family Health Survey-5, this paper highlights the potential role of insurers in supporting public health goals through data-driven interventions.



Introduction

India faces an accelerating burden of chronic diseases, with hypertension, diabetes, and obesity rising across all socioeconomic strata. While public health surveys like the NFHS provide valuable snapshots, there is a critical gap in **longitudinal, individual level data**—especially from the rapidly expanding **insured population** with digital health records.

Aditya Birla Health Insurance (ABHI) has built a proprietary Wellbeing Score™ (WBS) algorithm that stratifies members into low, medium, or high-risk tiers based on biomarker, physical and mental health data. Post assessing the high risk customers, this study presents a unique opportunity to track **real-world health trajectories** and draw comparative insights vis-à-vis national datasets like **NFHS-5.**

This paper addresses two key questions:

1. What longitudinal health patterns emerge from repeated biomarker measurements among insured individuals?
2. How do these patterns compare with broader population-level trends reported in NFHS-5 and other sources?

*Customers with low score amongst their peers with same data maturity.

Section 1: Methods and Data Source

1.1 Data Source and Study Population

This study is based on de-identified biomarker records of 522 thousand customers enrolled under Aditya Birla Health Insurance (ABHI) between December 2023 and December 2025. The primary data sources include:

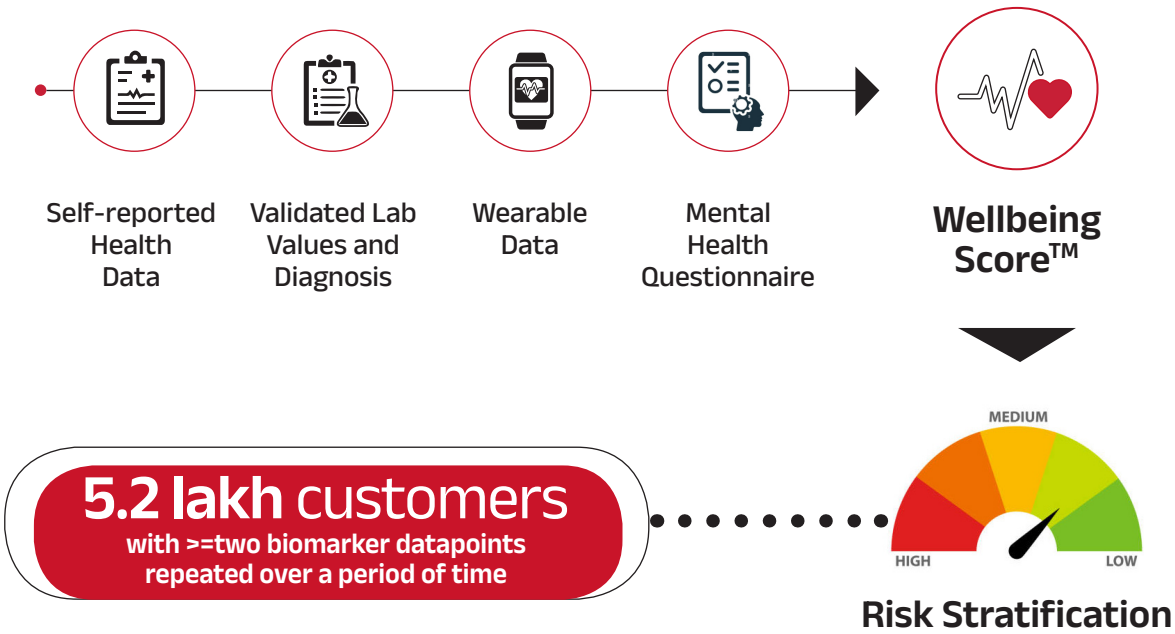
- **Health risk assessments (HRA), claim forms, and wellness programs**
- **Wearable-linked and app-entered/lab generated biomarker data (e.g., BP, sugar, BMI, cholesterol)**
- **Risk stratification outputs from ABHI's proprietary Wellbeing Score™ (WBS) algorithm**

We analysed 2.1 million health records of customers enrolled under ABHI as on December 23 to December 25. To ensure longitudinal validity, we included only customers with at least **two biomarker* datapoints** recorded over time, resulting in a final analytic cohort of **5,22,987 individuals.**

1.2 Risk Categorization and Scoring

ABHI's Wellbeing Score™ integrates biomarker values, lifestyle data and wearable/app data to stratify individuals' health status into – High risk, Medium risk and Low risk.

The algorithm is proprietary but calibrated against clinical guidelines (e.g., ADA, JNC-8, WHO). Customers were reassessed periodically, enabling risk reclassification over time.



*To evaluate longitudinal changes in health status, the analysis included only those customers who completed a minimum of two health assessments during the observation period and had valid biomarker readings for BMI, Blood Pressure, LDL Cholesterol, and HbA1c across both assessments.

1.3 Definition of Biomarker Improvement

A customer was classified as showing **"biomarker improvement"** if:

A biomarker parameter shifted towards normal range.



	Green Zone (Normal)	Orange Zone (Borderline)	Red Zone (High Risk)
Blood Pressure (SBP/DBP)[1]	SBP: 90 to 129.99 mmHg DBP: <90 mmHg	SBP: 130 -140 mmHg DBP: <=90 mmHg	SBP: >= 140 mmHg DBP: >=90 mmHg
BMI[2]	18.6 to 24.99	10 to 18.5 / 25 to 29.9	>=30
LDL Cholestrol[3]	<=129.99 mg/dL	130 to 159.99 mg/dL	>=160 mg/dL
HbA1c[4]	2 to 5.6%	5.7 to 6.49%	>6.5%

1.4 Analytical Framework

We analysed 2.1 million health records of customers enrolled under ABHI between December 2023 and December 2025.

Our framework focused on three layers:

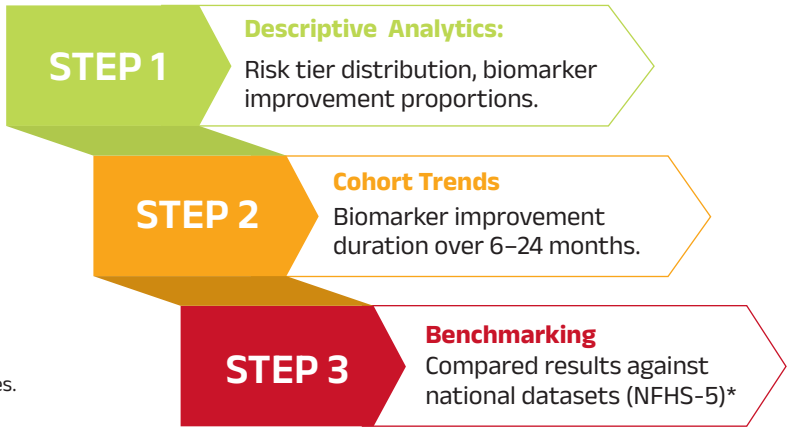
1. Descriptive Analytics: Risk tier distribution, biomarker improvement proportions.

2. Cohort Trends: Biomarker improvement duration over 6–24 months.

3. Benchmarking: Compared results against national datasets (NFHS-5) while clearly noting methodological differences.

Where possible, we disaggregated results by:

• **Gender** (Male/Female/Unspecified) • **Age Bands:** <35, 35–44, 45–59, 60+



*While clearly noting methodological differences.

Section 2: Results

2.1 Overview of Risk Distribution and Biomarker Availability

Out of the 2.1 million adult customers analyzed, 5.2 lakh individuals had at least two biomarker datapoints enabling longitudinal health trend analysis. The risk categorization at baseline was as follows:



These percentages represent the risk stratification split of eligible customers for whom two or more biomarker data points were available over a longitudinal basis.

These risk tiers reflect the health status derived from the Wellbeing Score™ algorithm, based on biomarkers, wearable data, and lifestyle data.

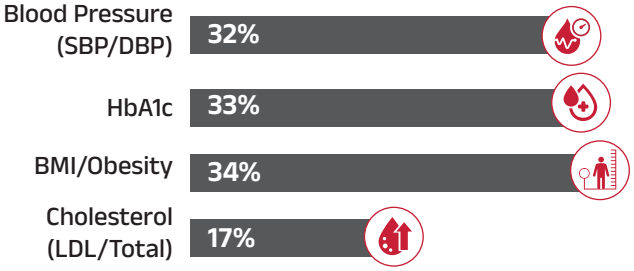
2.2 Biomarker Improvement and Risk Movement

Among the 5.2 lakh customers whose biomarker data points were available on a longitudinal basis:



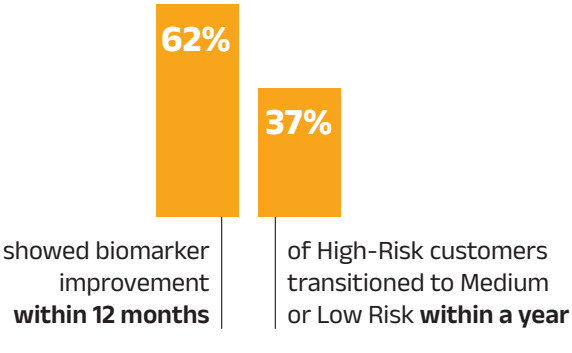
87% either maintained or improved their health status

Breakdown of biomarker improvements:





Quantum of biomarker improvements over time



showed biomarker improvement **within 12 months**

of High-Risk customers transitioned to Medium or Low Risk **within a year**

2.3 Age and Gender Stratification

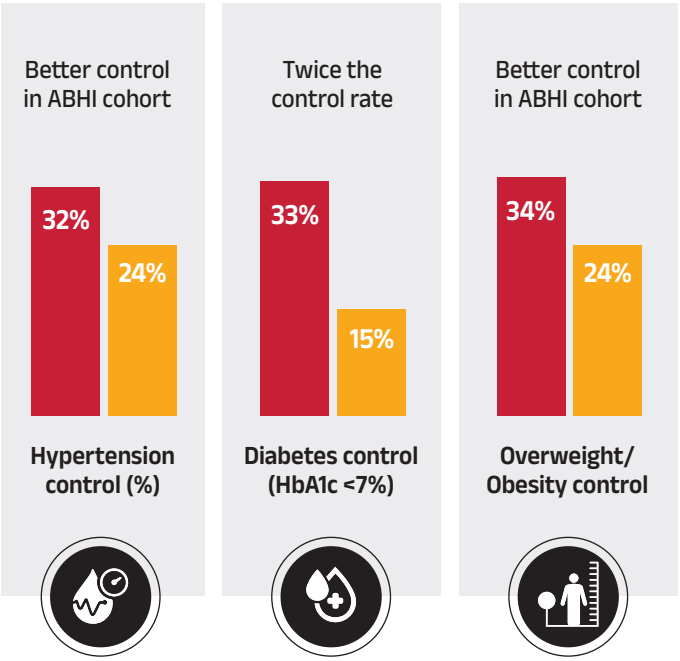
Health improvements were not uniform across groups:

Women (25,050)
>35yrs
were most likely to **improve biomarker control**

Men (38,933)
>45yrs
in contrast, had the **highest burden of uncontrolled hypertension** and **lowest improvement** rate

Youth (13,247)
(<35yrs)
showed the highest mobility between risk tiers, driven largely by **weight/BMI fluctuations**

2.4 Comparison with NFHS and National Benchmarks



Note: NFHS indicators use self-report or field-measured BP/sugar, while ABHI uses self-entered/app-measured biomarkers and lab integrations.

Section 3: Discussion and Interpretation

3.1 Interpreting Health Improvements in an Insured Cohort

This study presents a first-of-its-kind **real-world, biomarker-linked longitudinal analysis** of health trajectories among insured individuals in India. The data reveal that nearly **62% of customers with repeated biomarker data** showed measurable improvement over a 12-month period. This contrasts sharply with the general population, where control rates of hypertension and diabetes remain suboptimal despite awareness and diagnosis.

The higher improvement rates observed in this cohort may be attributed to multiple reinforcing mechanisms:

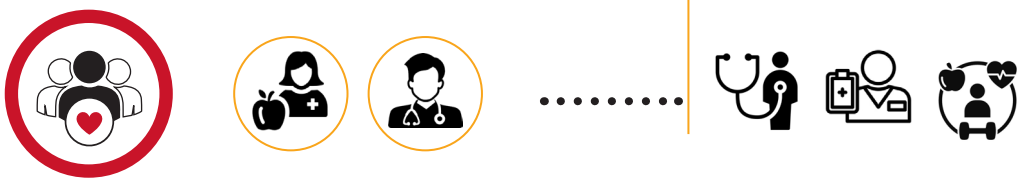
- **Digital health nudges and app-based reminders**
- **Insurer-led health interventions and coaching programs**
- **Greater health literacy and care access among the insured**

Health engagement for insured customers combines two key approaches:

Health Coaching

Guidance from a dedicated team of experts

Recommendations in the form of achievable steps



In Health Coaching, customers receive guidance from a dedicated team of MBBS doctors, nutritionists, physiotherapists, and counsellors. Coaching focuses on medication adherence, regular health checks, timely doctor visits, and practical lifestyle changes broken into small, achievable steps.

Hyper Personalized Recommendations

AI-powered digital journeys

Adaptive and effective communication across customer preferred channels



Risk based hyper personalised digital journeys are AI-powered and provide personalized tips, reminders, and educational content. These evolve based on health data, engagement patterns, and self-reported updates, ensuring recommendations stay relevant. This creates a feedback-driven model where every interaction helps refine future advice, making care more adaptive and effective. Communication is tailored to customer preferences—via calls, app, WhatsApp, or email.

3.2 Disparities in Outcomes: Age, Gender, and Risk Stratification

Our findings show clear heterogeneity in health improvement trajectories:

Women >35

Demonstrated better control of key metrics, with **self monitoring.**

Men >45

In contrast, had the highest burden of **uncontrolled hypertension** and lowest improvement rate.

Youth <35

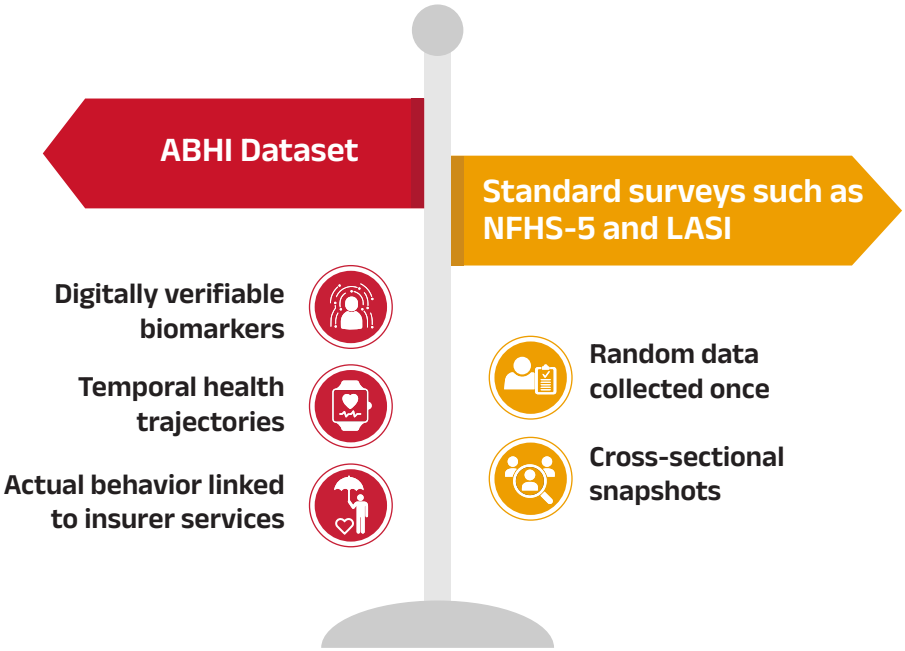
Showed high **volatility in biomarker indicators,** primarily driven by weight and BMI changes.

This underscores the importance of **age-tailored and gender-sensitive preventive care strategies.**

A one-size-fits-all model may fail to address underlying behavioral or biological determinants of risk.

3.3 Real-World vs. Survey-Based Insights: Challenging Traditional Benchmarks

The **NFHS-5** and **LASI surveys** have been instrumental in mapping the chronic disease burden in India, but they are limited by self-reporting biases and cross-sectional snapshots.



For example, **diabetes control (<7% HbA1c)** is observed in 33% of our population vs. 15% in NFHS—highlighting that real-time feedback and access to care may significantly impact health behaviors in insured segments.

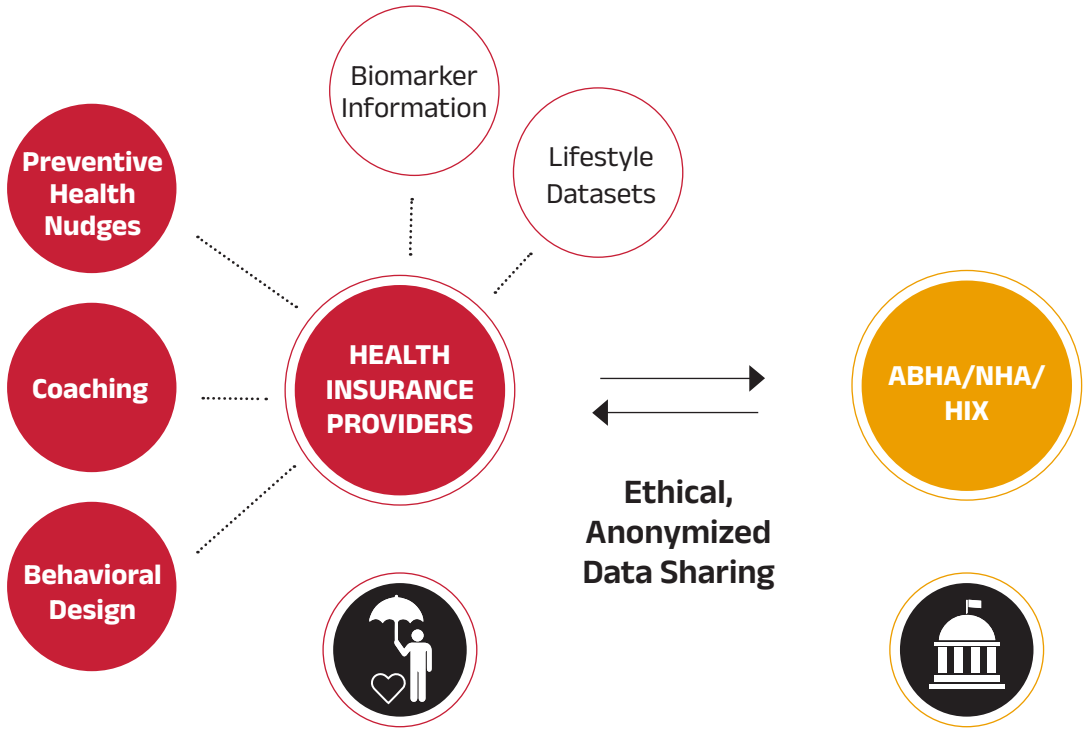
While this dataset is not nationally representative, it **fills a critical gap in health policy** discourse by offering an alternative lens into preventive health among urban, digitally connected populations.

3.4 Role of Insurers as Public Health Enablers

The evidence points toward a **transformative opportunity** for health insurers:

- Moving from **passive risk carriers** to **active health outcome managers**
- Integrating **preventive health nudges, coaching,** and **behavioral design** into benefit structures
- Collaborating with the Government's **ABDM, NHA,** and **NPCDCS** programs to share anonymized health trends for macro surveillance

Insurers today possess **large, continuously updating biomarker and lifestyle datasets** that—if harnessed with ethical, anonymized sharing—can **complement national health monitoring.**



MOVING FROM PASSIVE RISK CARRIERS TO ACTIVE HEALTH OUTCOME MANAGERS

3.5 Strengths and Limitations

STRENGTHS



Scale

Over 6.7 lakh insured lives with biomarker values evaluated across risk tiers



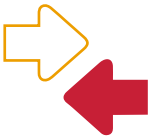
Continuity

Nearly 78% (5.2 lakh) had longitudinal biomarker data



Relevance

Tied directly to actuarial and wellness-linked outcomes



Comparability

Benchmarked against NFHS

LIMITATIONS



Selection Bias:

Data limited to urban, insured, digitally engaged individuals

Missing Socioeconomic Variables:

No direct income or caste stratification

Data Entry Validity:

Self-entered data, though validated via app rules, may carry entry errors

Despite these, the **real-world nature, size, and longitudinal continuity** of the data offer substantial merit, especially when triangulated with public survey data.

Section 4. Policy Implications and Conclusion

4.1 Leveraging Insurer-Generated Data for National Health Surveillance

India's policy landscape—led by the **Ayushman Bharat Digital Mission (ABDM)**—has laid the foundation for health data interoperability. However, **private insurers remain an underutilized node** in the national health data ecosystem.

Our analysis shows that insurers are in a unique position to:

- Capture near **real-time, structured health data**
- Link biomarker trends with behavior and intervention
- Identify high-risk cohorts for proactive engagement

Policy Suggestion: Create a **regulatory sandbox** under ABDM to allow safe, anonymized sharing of biomarker trends from insurers for **population-level trend detection.**

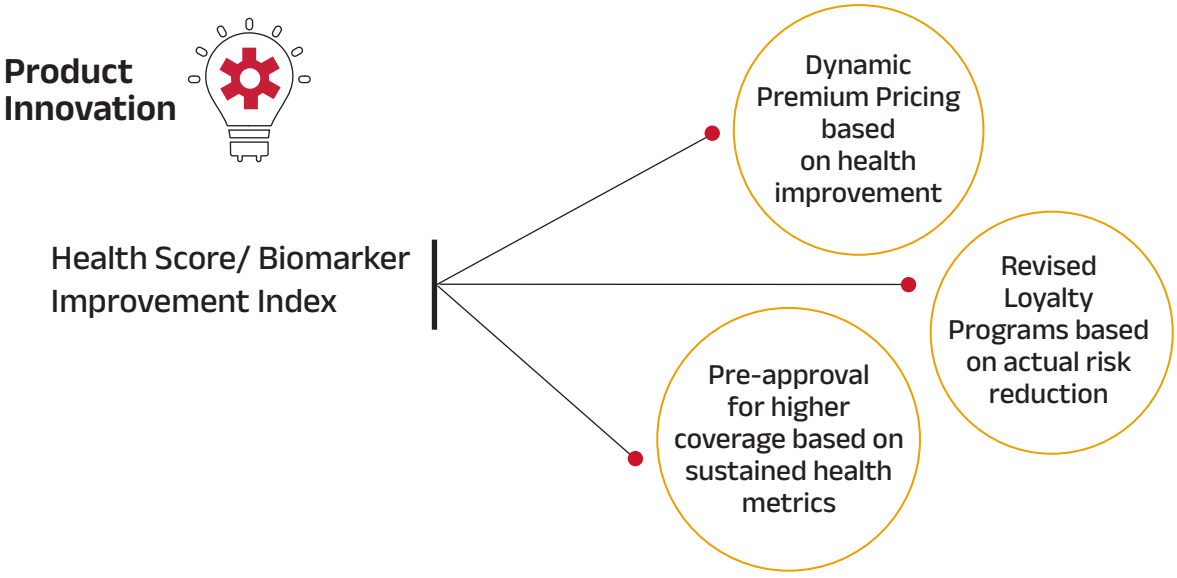
4.2 Rethinking Wellness-Linked Insurance Products

The current regulatory framework (IRDAI) allows linking health incentives to wellness activities, but **product innovation remains slow and limited to step count or doctor visits.**

Based on these findings, **Health Score or Biomarker Improvement Index** could become actuarially justifiable levers for:

- **Dynamic Premium Pricing** based on health improvement
- **Revised Loyalty Programs** based on actual risk reduction
- **Pre-approval for higher coverage** based on sustained health metrics

This marks a shift from static underwriting to **dynamic, behavior-linked underwriting,** unlocking new pathways for personalized preventive insurance.



4.3 Interoperability and Consent-Driven Ecosystems

Given the **Digital Personal Data Protection Act 2023 (DPDP)** and India's focus on consent-based frameworks, the insurer-driven ecosystem can become a model for:



Customer-led data sharing with healthcare providers, fitness apps, and insurers

Tokenized data exchange across platforms with explicit time-limited consent

Longitudinal health trends that empower customer and clinician alike

This reinforces the **citizen-centered** nature of India's digital health mission.

4.4 Call to Action for Policymakers and Industry

We urge:



For Regulators:

IRDAI and NHA should consider a **joint task force** to define safe use cases of insurer data for public health modeling

Incentivize innovation in wellness-linked products backed by robust data science



For Public Health Planners:

Treat insurers as partners for **surveillance, early warning, and nudging platforms**



For the Insurance Industry:

Move beyond generic wellness offerings

Invest in **analytics + behavioral science + UX** to create differentiated health journeys

Become **health risk reducers,** not just risk financiers

4.5 Conclusion

This study demonstrates that health risk within insured populations is **dynamic and modifiable,** and that **measurable improvement can be achieved** when sustained engagement and continuous biomarker monitoring are embedded into the insurance ecosystem. The observed heterogeneity across age and gender groups further reinforces the necessity of **differentiated preventive strategies,** as uniform wellness interventions are unlikely to deliver comparable outcomes across diverse cohorts.

Beyond reporting empirical outcomes, this analysis **illustrates how ABHI-led, longitudinal health data can be actively leveraged to improve preventive health performance.** As India's digital health infrastructure advances under ABDM, insurer-generated datasets—when systematically linked to engagement and intervention—already complement traditional public health surveys by providing **early signals, temporal patterns, and behavior-linked outcomes.** While not nationally representative, such datasets have demonstrated their value as **sentinel indicators** for emerging health risks within engaged populations.

Realizing this impact at scale will require governance frameworks that balance innovation with data protection, enable responsible data sharing, and support controlled experimentation through regulatory sandboxes. **The findings of this study indicate that ABHI has moved beyond the role of passive risk financiers and can function as active partners in prevention,** contributing to a more responsive, data-informed, and citizen-centric health ecosystem.

References

[1]BP - https://www.ncbi.nlm.nih.gov/books/NBK9630/

[2]BMI - https://apps.who.int/iris/handle/10665/42330

[3]LDL - https://www.nhlbi.nih.gov/files/docs/guidelines/atp3xsum.pdf

[4]HbA1c - https://diabetesjournals.org/care/article/47/Supplement_1/S20/153954/2-Diagnosis-and-Classification-of-Diabetes

Abbreviation	Full Form
ABHI	Aditya Birla Health Insurance
NFHS	National Family Health Survey
NFHS-5	National Family Health Survey – Round 5
HRA	Health Risk Assessment
WBS	Wellbeing Score
ADA	American Diabetes Association
JNC-8	Eighth Joint National Committee (Guidelines for Hypertension Management)
WHO	World Health Organization
LDL	Low-Density Lipoprotein
BP	Blood Pressure
SBP	Systolic Blood Pressure
DBP	Diastolic Blood Pressure
BMI	Body Mass Index
LASI	Longitudinal Ageing Study in India
ABDM	Ayushman Bharat Digital Mission
NHA	National Health Authority
NPCDCS	National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke
IRDAI	Insurance Regulatory and Development Authority of India
DPDP	Digital Personal Data Protection (Act)
HbA1c	Glycated Hemoglobin (measure of diabetes control)

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