StepMine

Whitepaper

Moving the world toward better health: an evidence-based mobile health platform with a community-owned reward layer.

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Health · Technology · Web3

stepmine.web.app

BEFORE YOU READ

Important notice

This whitepaper describes the StepMine platform, its health features, its reward system and its planned transition to an on-chain reward token. It is published for information purposes only. It does not constitute investment advice, a prospectus, an offer to sell, or a solicitation of an offer to buy any token, security or financial instrument in any jurisdiction.

StepMine is a general wellness application. It is not a medical device and has not been evaluated or cleared by any medical regulatory authority. Heart rate, heart rate variability and stress readings produced by the app are estimates for general wellness and self-awareness only. They are not intended to diagnose, treat, cure, monitor or prevent any disease or medical condition. Users should always consult a qualified health professional about any health concern, and should never ignore professional medical advice or delay seeking it because of something they have read in this document or seen in the app.

STEP is currently an in-app reward balance. At the time of writing, STEP has no cash value, cannot be withdrawn, transferred, sold or exchanged, and does not represent any ownership, debt, equity, profit share or claim on StepMine or any other entity. The roadmap described in this document, including wallet connectivity, on-chain issuance and the token allocation, reflects the current plans of the StepMine team. Plans may change as a result of technical, legal, regulatory, commercial or security considerations, and some planned features may never be delivered.

Statistics on physical activity, health outcomes and medication adherence quoted in this whitepaper come from the published sources listed in the References chapter. Associations reported in observational studies do not prove that one factor causes another. StepMine does not claim that use of the app will produce any particular health outcome for any individual.

References to third-party organisations, publications, networks or technologies are for identification and context only and do not imply endorsement of StepMine by those parties. Readers are responsible for complying with the laws and regulations that apply to them.

Summary of key facts

- StepMine is a free Android wellness app: step counter, camera heart rate, stress check, medication reminders and personal goals.
- Health readings are processed on the device. Heart rate, stress and medication data are not uploaded.
- Every 1,000 steps convert to 1 STEP. A daily reward of +5 STEP can be claimed every two hours.
- Planned total supply of on-chain STEP: 10,000,000,000. Community 80%, team 10%, liquidity pool 10%.
- STEP currently has no monetary value. The on-chain launch is planned, not live.

CONTENTS

Table of contents

1	Executive summary	4
2	The global inactivity crisis	6
3	The science of daily steps	9
4	Why healthy habits fail, and what helps	12
5	The StepMine platform	14
6	Step tracking technology	16
7	Heart rate with the phone camera	19
8	Stress and heart rate variability	22
9	Medication reminders and adherence	24
10	Personal goals and body metrics	26
11	Walking for health: a practical guide	28
12	Who StepMine is for	30
13	Privacy, security and data ethics	32
14	The STEP reward model	34
15	Fair play and anti-abuse	36
16	Web3 architecture	38
17	Tokenomics	41
18	Community and governance	43
19	Roadmap	44
20	Risks and limitations	45
A	Appendix A: Glossary	
B	Appendix B: Frequently asked questions	51
21	References	53

CHAPTER 1

Executive summary

01

Walking is the most natural, affordable and widely available form of physical activity on Earth. Yet a large and growing share of the world's adults do not move enough to protect their health. StepMine exists to close that gap with technology people already carry in their pockets.

According to the World Health Organization (WHO), about 31% of adults worldwide, approximately 1.8 billion people, did not meet the recommended levels of physical activity in 2022. Inactivity rose by about five percentage points between 2010 and 2022 and, if the trend continues, is projected to reach 35% by 2030.[1] Insufficient activity increases the risk of cardiovascular disease, type 2 diabetes, dementia and cancers such as breast and colon cancer.

At the same time, the scientific case for simple daily walking has never been stronger. Large meta-analyses of device-measured steps show that moving from very low step counts to moderate ones is associated with substantially lower risk of death and chronic disease. A 2025 meta-analysis in The Lancet Public Health found that, compared with 2,000 steps per day, 7,000 steps per day was associated with a 47% lower risk of all-cause mortality.[4] Benefits begin well before the popular 10,000-step target, which makes walking an achievable goal for most people.

The bottleneck is not knowledge; it is motivation and habit. Most people know that walking is good for them. What they lack is a reason to do it today, a simple way to see their progress, and a feeling that their effort counts. Behavioural science has shown that small, immediate rewards can shift everyday decisions: a systematic review of randomised trials found that modest financial incentives increased daily steps by around 600 on average, with part of the effect persisting after incentives ended.[5]

What StepMine is

StepMine is a mobile health platform built around four everyday tools and one reward layer:

- **Always-on step counting** using the phone's hardware step sensor, with no GPS and minimal battery use.
- **Camera-based heart rate** using photoplethysmography (PPG): a fingertip over the camera and flash for 30 seconds.
- **Stress and heart rate variability (HRV) checks** through a 60-second PPG recording and plain-language interpretation.
- **Medication reminders** that work offline and keep all medication data on the device.
- **STEP rewards** that turn verified movement into a visible, growing balance: 1,000 steps equal 1 STEP, with a +5 STEP daily reward every two hours.

What makes it different

StepMine is health-first. The reward layer exists to support healthy behaviour, not to replace it. The design decisions throughout this whitepaper follow from that principle: health data stays on the device; rewards are validated on the server against human-plausible limits; and the app never asks users to start a session, watch an ad, or press a button to have their steps counted. Steps are always counted. Rewards are a bonus on top of a habit that is good in its own right.

StepMine is also built to be accessible. It runs on the phone people already own. It does not require a wearable device, a subscription, or a gym. This matters because the people who stand to gain the most from walking more, those who currently move the least, are often the people least likely to buy dedicated fitness hardware.

The Web3 vision

Today STEP is an in-app balance stored securely in the user's account. The StepMine roadmap moves STEP on-chain in stages: first by letting users link a self-custody wallet, then by issuing STEP as a token with a fixed, published total supply of 10,000,000,000. Eighty percent of the supply is allocated to the community and enters circulation mainly through verified activity. Ten percent is allocated to the team that builds and maintains the platform, and ten percent is reserved for a liquidity pool at launch. BNB Chain is the planned launch network.

80%
of STEP supply allocated to the community

0
health readings uploaded to a server

1,000 → 1
steps to STEP conversion rate

How to read this document

Chapters 2 to 4 explain the health problem and the evidence behind StepMine's approach. Chapters 5 to 13 describe the platform, its health features and how it protects user privacy. Chapters 14 to 17 describe the reward model, fair-play mechanisms, Web3 architecture and tokenomics. Chapters 18 to 20 cover community, roadmap, and the risks and limitations every reader should understand before engaging with the project.

CHAPTER 2

The global inactivity crisis

02

Physical inactivity is sometimes described as a silent threat. It rarely makes headlines, it causes no immediate symptoms, and its damage accumulates slowly over years. But its scale is enormous.

2.1 How much activity do adults need?

The WHO guidelines on physical activity and sedentary behaviour recommend that adults do at least 150 to 300 minutes of moderate-intensity aerobic activity per week, or at least 75 to 150 minutes of vigorous-intensity activity, or an equivalent combination.[2] Brisk walking is a classic example of moderate-intensity activity. The guidelines also stress a simple message that underpins StepMine's design: some physical activity is better than none, and more is better.

The guidelines further recommend that adults limit the amount of time spent being sedentary, and that replacing sedentary time with physical activity of any intensity, including light intensity, provides health benefits.[2] Walking around the house, taking the stairs, or getting off public transport one stop early all count.

2.2 How many people fall short?

In June 2024, WHO and academic colleagues published new estimates in The Lancet Global Health covering 163 countries and territories. They found that nearly one third of adults, 31% or approximately 1.8 billion people, did not meet the recommended levels of physical activity in 2022.[1] The analysis combined more than 500 studies involving 5.7 million people.

31%
of adults worldwide insufficiently active in 2022

+5 pts
rise in inactivity between 2010 and 2022

35%
projected inactivity by 2030 if trends continue

The trend is moving in the wrong direction. Inactivity increased by about five percentage points between 2010 and 2022, and if current trends continue, it is projected to reach 35% by 2030. That would leave the world off track to meet the global target, agreed by the World Health Assembly, of a 15% relative reduction in physical inactivity by 2030.[1]

2.3 Who is most affected?

The burden is not evenly distributed. Globally, women are less active than men, with inactivity rates of 34% compared with 29%, and in some countries the gap is as large as 20 percentage points. People over 60 are less active than other adults.[1] Regional differences are also striking:

the highest inactivity rates were observed in the high-income Asia Pacific region (48%) and South Asia (45%), while rates in other regions ranged from 28% in high-income Western countries to 14% in Oceania.[1]

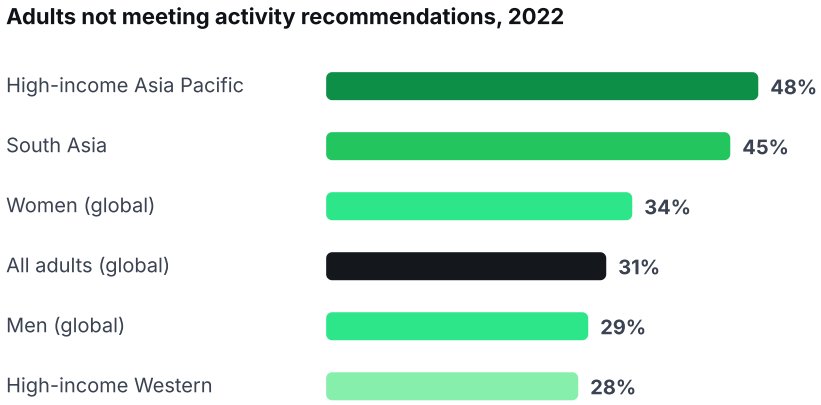


Figure 2.1 · Selected inactivity rates reported by WHO and The Lancet Global Health (2024).[1]

2.4 Why is inactivity rising?

WHO researchers point to multiple causes: people walk less, work at computers more and spend more leisure time looking at screens. Modern environments make inactivity the default. Cars replace walking for short trips, lifts replace stairs, and delivery services replace errands. Smartphones are part of the problem, because they hold attention for hours each day. StepMine's premise is that they can also be part of the solution.

2.5 The health consequences

Physical inactivity puts adults at greater risk of cardiovascular diseases such as heart attacks and strokes, type 2 diabetes, dementia, and cancers such as breast and colon cancer.[1] These are among the leading causes of death and disability worldwide. They are also largely chronic conditions: they develop over years and, once established, often require lifelong treatment, which connects the problem of inactivity to the problem of medication adherence discussed in Chapter 9.

2.6 The economic cost

WHO's Global status report on physical activity 2022 estimated that, if current levels of inactivity do not change, almost 500 million new cases of preventable noncommunicable diseases will occur worldwide between 2020 and 2030, costing health systems about US$27 billion per year.[3] These costs fall on families, employers and public health systems alike, and they are concentrated among conditions that regular moderate activity helps to prevent.

WHO's call for innovation

Commenting on the 2024 findings, WHO's Director of Health Promotion said that the world needs innovative approaches to motivate people to be more active, taking into account age, environment and cultural background, and that physical activity should be made accessible, affordable and enjoyable for all.[1] StepMine is designed around exactly these three words: accessible (it runs on an ordinary phone), affordable (it is free), and enjoyable (progress is visible and rewarded). StepMine is not affiliated with or endorsed by WHO.

2.7 Implications for StepMine

Three lessons from the evidence shape StepMine's design. First, the target audience is broad: inactivity affects every region, age group and income level, so the product must be simple, lightweight and free. Second, the biggest gains come from helping the least active people do a little more, so the app must reward progress at every level, not only athletic achievement. Third, the problem is behavioural and long-term, so the product must support daily habits over months and years, not short bursts of enthusiasm.

CHAPTER 3

The science of daily steps

03

Step count is the simplest, most universal measure of everyday movement. It is easy to understand, easy to measure with a phone, and, as a growing body of research shows, closely linked to long-term health.

3.1 Why steps?

Physical activity can be described in many ways: minutes of exercise, energy expenditure, heart rate zones, distance, or sport-specific metrics. For population health, steps have unique advantages. Almost everyone walks. Steps accumulate across the day from commuting, housework, shopping and leisure, so they capture activity that structured exercise logs miss. And steps can be measured passively, without the user doing anything, by the motion sensors built into modern smartphones.

As one researcher behind a major step-count meta-analysis put it, steps are very simple to track and are a clear communication tool for public health messaging. A number is easy to remember, easy to compare with yesterday, and easy to improve.

3.2 The myth and the evidence behind 10,000 steps

The target of 10,000 steps per day is widely promoted, but it did not originate from clinical research. The authors of the 2022 Lancet Public Health meta-analysis on daily steps noted that although 10,000 steps per day is widely promoted to have health benefits, there was little evidence to support that specific recommendation.[6] The newer evidence, summarised below, suggests that meaningful health benefits begin at lower step counts. This is good news, because it makes healthy walking achievable for many more people.

3.3 Paluch et al., 2022: steps and mortality across 15 cohorts

The Steps for Health Collaborative pooled participant-level data from 15 international studies with 47,471 adults, followed for a median of 7.1 years.[6] Participants were grouped into quartiles of daily steps, with median values of 3,553, 5,801, 7,842 and 10,901 steps per day.

Quartile	Median steps/day	Adjusted hazard ratio, all-cause mortality
Q1 (reference)	3,553	1.00
Q2	5,801	0.60 (95% CI 0.51–0.71)
Q3	7,842	0.55 (95% CI 0.49–0.62)
Q4	10,901	0.47 (95% CI 0.39–0.57)

Compared with the lowest quartile, the three more active groups had a 40% to 53% lower risk of death during follow-up. The analysis also found that the benefit levelled off at different points depending on age: among adults aged 60 and older, risk decreased progressively up to about 6,000 to 8,000 steps per day, and among adults younger than 60, up to about 8,000 to 10,000 steps per day.[6]

3.4 Ding et al., 2025: steps and a broad range of health outcomes

In 2025, a team led by the University of Sydney published the most comprehensive review to date in The Lancet Public Health. It synthesised 57 prospective studies from 35 cohorts published between 2014 and 2025, with 31 studies from 24 cohorts contributing to meta-analyses. Unlike earlier work focused mainly on mortality, it examined outcomes including cardiovascular disease, cancer, type 2 diabetes, dementia, depressive symptoms, physical function and falls.[4]

−47%
all-cause mortality

−25%
cardiovascular disease incidence

−47%
cardiovascular disease mortality

−37%
cancer mortality

Risk at 7,000 steps/day compared with 2,000 steps/day, Ding et al. 2025.[4]

Compared with 2,000 steps per day, 7,000 steps per day was associated with a 47% lower risk of all-cause mortality, 25% lower cardiovascular disease incidence, 47% lower cardiovascular disease mortality and 37% lower cancer mortality, alongside lower risk of type 2 diabetes, dementia, depressive symptoms and falls.[4] For cardiovascular mortality, cancer, type 2 diabetes and depressive symptoms, the relationship was inverse and approximately linear: more steps were associated with progressively lower risk.

The authors concluded that although 10,000 steps per day remains a viable target for people who are already more active, 7,000 steps per day is associated with clinically meaningful improvements and may be a more realistic and achievable target for many. Importantly, they also reported that even small increases, such as moving from 2,000 to 4,000 steps per day, were associated with significant health gains.[4]

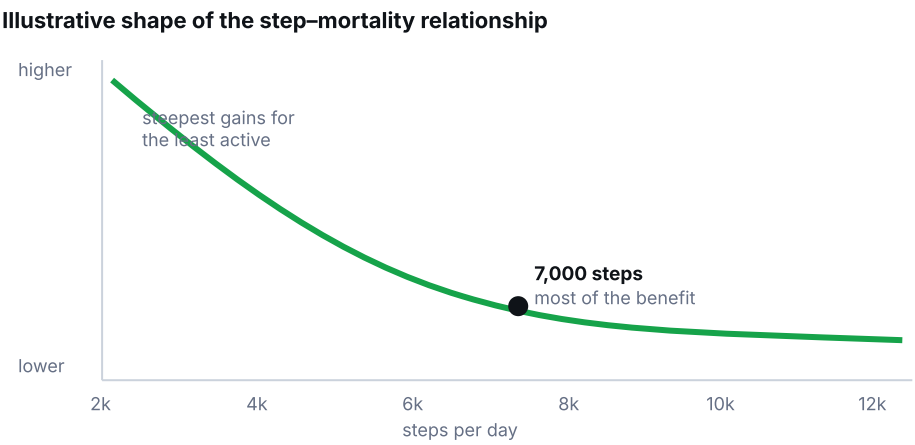


Figure 3.1 · Schematic summary, not plotted data. Risk falls steeply at low step counts and flattens at higher counts.[4] [6]

3.5 What the evidence means for product design

The research has three practical implications that StepMine builds into its experience:

- **Every step counts, especially the first ones.** The steepest part of the curve is at the low end. StepMine therefore rewards every 1,000 steps, not only big milestones, so that someone moving from 2,000 to 4,000 steps sees real progress.
- **Goals must be personal.** The right target depends on age, health and starting point. StepMine lets users set any daily goal between 1,000 and 100,000 steps rather than imposing a single number.
- **Consistency matters more than peaks.** Health benefits are associated with habitual daily activity measured over time. StepMine counts continuously and shows weekly history to encourage steady habits.

3.6 A note on causation

The studies above are observational. They show that people who walk more tend to have better health outcomes, after adjusting for many other factors, but they cannot by themselves prove that walking caused the difference. Some people walk less because they are already unwell. The authors of these studies acknowledge such limitations, including potential residual confounding and limited age-specific data.[4] Nonetheless, the consistency of findings across many cohorts, the dose-response pattern, and the large body of experimental evidence on physical activity and health together make a strong case that more daily movement is good for most people. StepMine presents this evidence honestly and does not promise any specific outcome to any individual.

CHAPTER 4

Why healthy habits fail, and what helps

04

If walking is so beneficial and so simple, why do so many people not do enough of it? The answer lies less in physiology than in psychology.

4.1 The intention-behaviour gap

Surveys consistently show that most people want to be more active. Yet good intentions often fail to become daily action. Health researchers call this the intention-behaviour gap. Fatigue, busy schedules, bad weather, lack of company and the pull of screens all compete with the decision to go for a walk. Each individual choice to skip a walk seems harmless; it is only the accumulation over months and years that causes harm.

4.2 Present bias

Behavioural economics offers a clear explanation. People tend to give more weight to immediate costs and benefits than to future ones, a tendency called present bias. In the case of physical activity, the costs, such as time, effort and discomfort, are felt right now, while the benefits, such as a healthier heart and lower disease risk years from now, are delayed and invisible.[5] This mismatch leads to the familiar resolution to "exercise more tomorrow".

The behavioural economics response is to make some of the benefits immediate. If walking today produces a small, visible reward today, the daily decision tilts toward activity. This is the core idea behind StepMine's reward layer.

4.3 What the evidence says about incentives

A systematic review and meta-analysis published in the British Journal of Sports Medicine examined 23 randomised controlled trials of financial incentives for physical activity, involving 6,074 adults.[5] Key findings:

- 20 of 22 studies reported positive effects during the intervention period.
- In the 12 studies included in the step-count meta-analysis, incentives were associated with an increase of about 607 steps per day during the intervention (95% CI 422 to 792).
- In nine studies with follow-up data after incentives stopped, daily steps remained about 514 higher than in control groups (95% CI 313 to 715).
- Modest incentives, averaging about US$1.40 per day, were effective.

The authors concluded that, contrary to some earlier assumptions, a short-term incentive "dose" may promote sustained physical activity, although post-intervention evidence was mixed.[5]

Commentary on the study also highlighted that small but immediate rewards, attached to realistic goals, work better than large, delayed or hard-to-reach rewards.

Design lessons StepMine applies

- **Immediate:** steps convert to STEP as soon as the app opens, and the daily reward is available every two hours.
- **Realistic:** rewards begin at 1,000 steps, not at an athletic threshold.
- **Visible:** the balance, the goal ring and weekly history make progress concrete.
- **Friction-free:** no session to start, no button to press for counting, no GPS to enable.

4.4 Intrinsic and extrinsic motivation

A common concern is that external rewards might crowd out intrinsic motivation, the enjoyment of an activity for its own sake. The evidence on physical activity incentives does not support a strong version of this concern, since several trials observed effects that persisted after incentives were removed.[5] StepMine nevertheless treats rewards as scaffolding rather than the main event. The app pairs every reward with health information: the goal ring, distance, calories, active minutes, and health tools that help users notice how they feel. The aim is for users to start walking for the reward and keep walking because they feel better.

4.5 Habit formation

Habits form when a behaviour is repeated consistently in a stable context. StepMine supports this in three ways. First, by counting all steps automatically, it removes the need to remember to start tracking. Second, by offering a recurring daily reward, it creates a natural cue to open the app several times a day and see progress. Third, by letting users set a personal daily goal, it gives a clear, repeatable target that fits their own life.

4.6 Social influence

People are more likely to stay active when friends and family are active too. StepMine's referral system rewards users who invite others, sharing 5% of the rewards their friends earn. This creates a light social incentive to bring people along, without requiring public leaderboards or competitive pressure that can discourage beginners.

4.7 Ethical boundaries

Reward systems can be misused to drive compulsive engagement. StepMine sets clear limits. Rewards are tied to real movement and to a time-based daily reward, not to unlimited tapping or watching. The app does not use streak penalties, loss-framed notifications or manipulative countdowns. Rest days are normal and are never punished. Health always comes first.

CHAPTER 5

The StepMine platform

05

StepMine is a native Android application, written in Kotlin, backed by a lightweight cloud service for accounts and rewards. Everything a user needs to look after their daily activity fits on a single home screen.

5.1 Design principles

Principle	What it means in practice
Health first	Every feature must help people move more or understand their body better. Rewards support health; they never compete with it.
Zero friction	Steps are counted automatically from the moment permission is granted. There is no session to start and nothing to remember.
On-device by default	Health readings are computed and stored on the phone. The server only sees what it needs to validate rewards.
Honest results	Readings come with plain-language explanations, reference ranges and clear wellness disclaimers.
Light and fast	The app is designed to run smoothly on mid-range phones and to have minimal impact on battery life.
Accessible	Free to use, no wearable required, one-tap Google sign-in.

5.2 The home screen

The home screen is organised from the most important daily information to the supporting tools:

1. **Today's ring.** A circular progress ring shows today's steps against the user's personal goal, with the percentage completed.
2. **Daily stats.** Distance, estimated calories and active minutes, calculated from steps and the user's own body measurements.
3. **Balance card.** The user's STEP balance, the conversion rule (1,000 steps = 1 STEP) and the daily reward button with its cooldown timer.
4. **Health section.** Cards for heart rate, stress and medication reminders, each showing the latest result or next dose.
5. **Weekly chart.** Step totals for the last seven days.

5.3 User journey

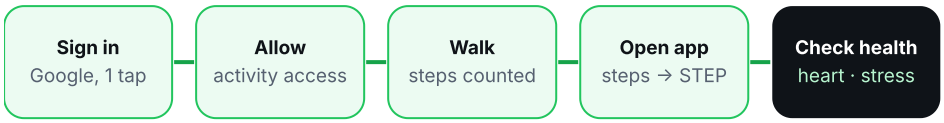


Figure 5.1 · From first launch to a daily routine.

5.4 System architecture

StepMine has three layers:

- **The device layer** runs on the user's phone. It reads the hardware step counter, schedules periodic background reads, performs heart rate and stress analysis with the camera, stores medication schedules, and fires local reminders. All health computation happens here.
- **The service layer** runs in the cloud on Google Firebase. Firebase Authentication handles secure Google sign-in. Cloud Firestore stores each user's account record and reward balance. Cloud Functions, running in a European region, execute every reward operation on the server: converting steps, granting daily rewards, completing tasks, applying referral shares, and deleting accounts.
- **The chain layer**, planned for a later phase, will connect user accounts to self-custody wallets and issue STEP as an on-chain token. It is described in Chapter 16.

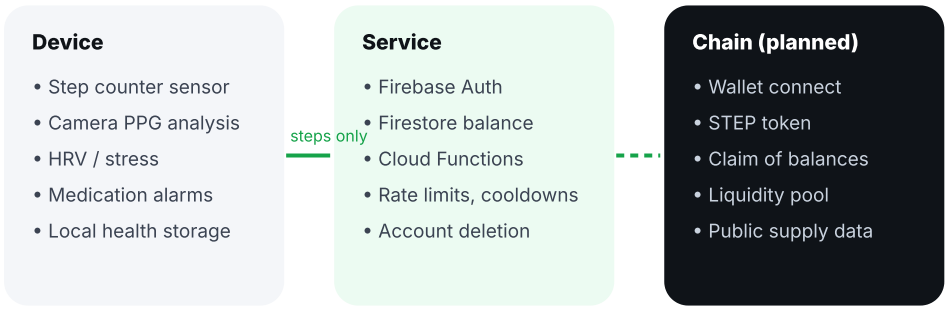


Figure 5.2 · Only step totals cross from the device to the service layer. Health readings never do.

5.5 Technology choices

Native Kotlin was chosen over cross-platform frameworks for direct access to Android sensors, camera APIs and background scheduling, and for performance on modest hardware. CameraX provides reliable camera control, including the torch, across many device models. WorkManager schedules battery-friendly background work. Firebase provides proven authentication and a managed, scalable backend without maintaining servers. Server code runs on Node.js in Cloud Functions, where every reward rule is enforced.

CHAPTER 6

Step tracking technology

06

Accurate, effortless step counting is the foundation of StepMine. It has to work all day, every day, without draining the battery or asking anything of the user.

6.1 The hardware step counter

Most modern Android phones include a dedicated, low-power motion co-processor that detects steps directly in hardware. Android exposes it to apps as the step counter sensor (`Sensor.TYPE_STEP_COUNTER`), which reports the total number of steps taken since the device was last rebooted.[12] Because counting happens in dedicated low-power hardware, steps are recorded even while the phone is asleep in a pocket and even when StepMine itself is closed.

StepMine does not need to keep the app running or the screen on to count steps. It only needs to read the counter from time to time and work out how much it has increased.

6.2 Turning a counter into daily steps

The sensor reports a single, ever-increasing number. StepMine converts it into daily totals with a simple, robust procedure:

```
on first read:   baseline ← counter
on each read:    delta ← counter − baseline
                 if delta < 0 (device rebooted): delta ← counter
                 today      += delta
                 pending    += delta
                 lifetime   += delta
                 baseline   ← counter
```

The *today* total feeds the progress ring and weekly chart. The *pending* total holds steps that have not yet been converted to STEP. The *lifetime* total and best day are shown on the user's profile. Step history for each day is stored locally on the device.

6.3 Background reads

StepMine reads the counter whenever the app is opened and, in the background, through Android WorkManager about every 15 minutes, the minimum periodic interval Android allows. WorkManager lets the operating system batch background work efficiently, which protects battery life. Because the hardware keeps counting between reads, nothing is lost if a read is delayed; the next read simply sees a larger increase.

6.4 Distance, calories and active time

Steps alone are abstract. StepMine translates them into familiar measures using the user's own height and weight, entered on the profile screen.

```
stride length (m)  ≈ height (m) × 0.415
distance (km)      = steps × stride length ÷ 1000
calories (kcal)    ≈ steps × body weight (kg) × factor
active minutes     ≈ steps ÷ typical walking cadence
```

These are standard approximations used widely in pedometer applications. They are estimates: actual stride length varies with speed, terrain and individual gait, and energy expenditure varies with fitness, age and body composition. StepMine labels them as estimates and lets users switch between kilometres and miles.

6.5 Battery and performance

Approach	Battery impact	StepMine
GPS-based tracking	High	Not used
Continuous accelerometer processing in the app	Medium to high	Not used
Hardware step counter, periodic reads	Very low	Used

By relying on the hardware counter and periodic reads, StepMine avoids the two biggest battery drains in fitness apps: location tracking and continuous sensor processing. The app also requests no location permission at all.

6.6 Permissions

Android requires the Physical Activity Recognition permission for apps to read the step counter. StepMine asks for it once, explains why, and shows a clear prompt on the home screen if it has not been granted. Notification permission is requested separately so that reward-ready and medication reminders can be delivered.

6.7 Limitations

Hardware step counters are designed to detect walking and running. They may miss some steps at very slow speeds, may not count activities that do not involve stepping, such as cycling or swimming, and can occasionally register movements such as vigorous shaking as steps. Accuracy also varies between phone models. Steps are only counted while the phone is carried.

StepMine is open about these limits and combines step data with server-side checks, described in Chapter 15, to keep rewards fair.

CHAPTER 7

Heart rate with the phone camera

07

With nothing more than a fingertip, a camera and a flash, a smartphone can estimate pulse rate. StepMine turns this well-studied technique into a simple 30-second check.

7.1 Photoplethysmography

Photoplethysmography, or PPG, is an optical method for detecting changes in blood volume in tissue. The name combines "photo" (light), "plethysmo" (volume) and "graphy" (recording). With each heartbeat, a pulse of blood reaches the small vessels of the fingertip, slightly increasing the amount of light the tissue absorbs. Between beats, absorption decreases again. Measuring these tiny, rhythmic changes in light reveals the pulse.[8]

Clinical pulse oximeters use the same principle with dedicated light sources and sensors. A smartphone can approximate it: the flash LED illuminates the fingertip and the camera sensor records how much light passes through or is reflected back.

7.2 How StepMine measures

1. The user places a fingertip gently over the rear camera and flash and holds still.
2. StepMine turns on the torch and analyses low-resolution camera frames (320 × 240 pixels) at about 30 frames per second using CameraX.
3. For each frame, the app computes the average intensity of the red channel, which is most sensitive to blood volume changes when light passes through a finger.
4. The resulting signal is detrended and smoothed to remove slow drift and noise, and individual beats are detected as peaks.
5. The time between successive beats is converted to beats per minute. After 30 seconds, StepMine reports a robust average and draws the pulse waveform.

Frames are processed in memory and immediately discarded. No image or video is saved, and nothing is uploaded.

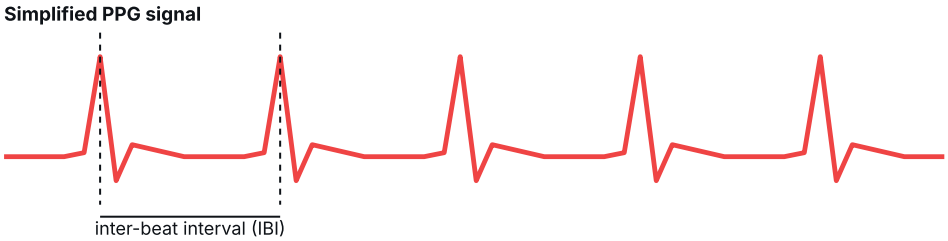


Figure 7.1 · Each peak marks a heartbeat. Pulse rate = 60 ÷ average IBI in seconds.

7.3 How accurate is smartphone PPG?

Smartphone PPG has been studied for more than a decade. A meta-analysis in JMIR Cardio pooled studies comparing smartphone apps using finger PPG with validated methods such as ECG and pulse oximetry. It found no significant difference in heart rate between the smartphone and the validated method (mean difference −0.32 beats per minute), and in adults the correlation coefficient was always 0.90 or higher. The authors concluded that such apps appear to agree with validated methods in adults during resting sinus rhythm, but noted that use in children was not validated.[8]

A 2024 scoping review in Frontiers in Digital Health also reported good agreement for resting heart rate in many studies, while highlighting that accuracy depends on measurement conditions, devices and algorithms, and calling for more rigorous, standardised validation before clinical use.[9]

7.4 Interpreting the result

Result	Range (adults at rest)	What StepMine tells the user
Low	Below 60 bpm	Can be normal for fit people or during deep rest. If combined with dizziness, fainting or unusual tiredness, talk to a doctor.
Normal	60 to 100 bpm	Within the typical resting range for adults. Measure at the same time each day to follow your trend.
High	Above 100 bpm	Can follow activity, caffeine, stress or illness. Rest for five minutes and measure again. If it stays high, or if you have chest pain or shortness of breath, seek medical advice.

Each result is shown with a coloured badge, a short explanation, a "what to do" section and the reference range, followed by a history of previous measurements.

7.5 Getting a good reading

- Sit down and rest for a few minutes before measuring.
- Cover both the camera and the flash with the fingertip, pressing lightly. Pressing too hard squeezes blood out of the fingertip and weakens the signal.
- Keep the hand and phone still and stay quiet during the 30 seconds.
- Avoid measuring with very cold fingers, which reduce blood flow to the skin.

7.6 Limitations and safety

Camera PPG is sensitive to motion, finger pressure, ambient light, skin temperature and phone hardware. It may be less reliable with irregular heart rhythms. StepMine's heart rate feature is for general wellness. It is not designed to detect arrhythmias, heart attacks or any medical condition, and must never be used in place of professional medical care. Anyone with chest pain, severe shortness of breath, fainting or other alarming symptoms should contact emergency services immediately.

CHAPTER 8

Stress and heart rate variability

08

The heart does not beat like a metronome. The small variations between beats carry information about how the body is responding to its environment, including stress.

8.1 What is heart rate variability?

Heart rate variability (HRV) is the variation in time between consecutive heartbeats. A heart beating at 60 beats per minute does not produce a beat exactly every 1.000 seconds; intervals might be 0.95, 1.04, 0.98, 1.02 seconds and so on. These fluctuations are produced largely by the autonomic nervous system, the part of the nervous system that regulates functions we do not consciously control.[10][11]

The autonomic nervous system has two main branches. The sympathetic branch prepares the body for action ("fight or flight") and tends to raise heart rate and reduce variability. The parasympathetic branch supports rest and recovery ("rest and digest") and tends to slow the heart and increase beat-to-beat variability. In general, higher resting HRV reflects stronger parasympathetic activity and greater flexibility to adapt, while lower HRV is often observed under stress, fatigue or illness.[11]

8.2 HRV and stress: the evidence

A meta-analysis and review published in Psychiatry Investigation examined studies of HRV and psychological stress. It concluded that HRV is affected by stress and that low parasympathetic activity, reflected by decreased HRV, is the most consistent finding under stressful conditions, supporting HRV as an objective indicator of stress.[13] HRV is influenced by many other factors as well, including age, fitness, breathing, posture, sleep, caffeine, alcohol and medication, so single readings should be interpreted with care.

8.3 How StepMine estimates stress

The stress check uses the same camera PPG technique as the heart rate check, but records for 60 seconds to capture enough beats for variability analysis.

1. Beats are detected in the PPG signal and inter-beat intervals (IBIs) are calculated in milliseconds.
2. Implausible intervals caused by motion or noise are filtered out.
3. StepMine calculates RMSSD, the root mean square of successive differences between intervals, a standard short-term time-domain HRV measure strongly associated with parasympathetic activity.[10][11]

4. RMSSD is mapped to a stress level of low, moderate or high, and shown with the HRV value in milliseconds.

$$RMSSD = \sqrt{\text{mean}\left((IBI_{i+1} - IBI_i)^2 \right)}$$

8.4 Presenting the result

Each stress result includes a coloured badge, a short explanation of what the number means, practical suggestions, and history. Suggestions are simple and safe: slow breathing for a few minutes, a short walk, stepping away from screens, hydration, and sleep. When stress is high, StepMine suggests trying a short walk, connecting the stress tool back to the platform's central habit: movement.

Example guidance shown in the app

High stress. Your heart rate variability is lower than usual for a relaxed state. Try breathing slowly, in for four seconds and out for six, for two minutes, then measure again. A ten-minute walk can also help. If you often feel overwhelmed, consider talking to a health professional.

8.5 Limitations

Short smartphone PPG recordings provide an estimate of HRV, not a clinical assessment. Movement, talking, irregular breathing and irregular heart rhythms can distort results. HRV norms vary widely between individuals, so trends over time for the same person are more meaningful than comparisons with others. The stress feature is not a diagnostic tool for anxiety, depression or any other condition. Anyone experiencing persistent distress should seek support from a qualified professional.

CHAPTER 9

Medication reminders and adherence

09

Many of the conditions linked to inactivity, such as high blood pressure, type 2 diabetes and heart disease, are managed with long-term medication. Taking that medication as prescribed is one of the most effective and most neglected health behaviours.

9.1 The adherence problem

In its landmark report Adherence to long-term therapies: evidence for action, WHO described poor adherence to long-term treatment as a worldwide problem of striking magnitude. It stated that in developed countries, adherence among patients with chronic diseases averages only 50%, and is even lower in developing countries.[14] For high blood pressure, the report cited adherence of only 27%, 43% and 51% in Gambia, China and the United States respectively. It also gave a stark example of the consequences: in Sudan, only 18% of non-adherent patients achieved good blood pressure control, compared with 96% of adherent patients.[14]

~50%
average adherence to long-term therapy in developed countries

18% vs 96%
blood pressure control, non-adherent vs adherent patients (Sudan)

27–51%
adherence to blood pressure medication in three countries studied

A widely cited review in Mayo Clinic Proceedings similarly noted that the full benefits of medicines for chronic illness are often not realised because approximately 50% of patients do not take their medications as prescribed.[15] Researchers have also cautioned that adherence varies widely by condition, population and measurement method, so a single global figure is a simplification.[16] What is clear is that non-adherence is common and costly.

9.2 Why people miss doses

Reasons for non-adherence are varied: forgetting, complex schedules, side effects, cost, low perceived benefit when symptoms are absent, and limited understanding of the treatment. Forgetting is one of the most common and most easily addressed. A timely, reliable reminder cannot solve every barrier, but it removes one of the simplest.

9.3 How StepMine's reminders work

- Users add each medicine with a name, an optional dose note and one or more daily reminder times.
- At each time, StepMine shows a notification on its own medication channel. The user can mark the dose as taken directly from the notification or from the app.

- The home screen shows the next upcoming dose and how many doses have been taken today.
- Reminders are scheduled with the Android alarm system and are automatically restored after the phone restarts, after the time is changed, or after the time zone changes, so travelling users keep receiving reminders at the right local time.

9.4 Offline and private by design

Medication data are among the most sensitive personal information a person can have. StepMine stores medication names, doses, times and history only on the device. Nothing is sent to StepMine's servers and reminders work without an internet connection. If the user deletes the app, the data is removed with it.

9.5 Responsible use

StepMine's reminder feature helps users follow their own schedule. It does not recommend medicines, doses or timings, does not check for interactions and does not replace the advice of a doctor or pharmacist. Users should always follow the instructions of their healthcare provider and the medicine's label.

CHAPTER 10

Personal goals and body metrics

10

There is no single right number of steps for everyone. A goal that motivates one person may overwhelm another. StepMine puts the user in charge of their own target.

10.1 Setting a daily goal

On the profile screen, users can set any daily step goal from 1,000 to 100,000, either by typing a number or choosing a quick option. The progress ring on the home screen adjusts immediately. The default goal is 10,000 steps, a familiar reference point, but the evidence in Chapter 3 suggests that many people will benefit from starting lower and building up.

Starting point	Suggested approach
Under 3,000 steps/day	Start with a goal of 3,000 to 4,000. Even this increase is associated with meaningful health gains.[4]
3,000 to 6,000 steps/day	Aim for around 7,000, where much of the observed benefit occurs.[4]
Above 7,000 steps/day	Maintain consistency, or progress toward 8,000 to 10,000 if you are under 60.[6]

These are general suggestions, not medical advice. People with health conditions should agree activity goals with their doctor.

10.2 Height and weight

Users can enter their height (100 to 250 cm) and weight (30 to 250 kg). These values are used only on the device to personalise distance and calorie estimates, as described in Chapter 6. They are validated on entry and can be changed at any time.

10.3 Profile insights

The profile screen summarises the user's journey: current STEP balance, total lifetime steps and best day. These numbers turn a long series of ordinary days into a visible achievement, which supports long-term motivation.

10.4 Small steps, big picture

Personal goals reflect a simple philosophy: progress over perfection. The researchers behind the 2025 Lancet Public Health review described their work as helping to shift the focus from perfec-

tion to progress, noting that even small increases in daily movement can lead to meaningful health improvements.[4] StepMine is built to celebrate exactly those small increases.

CHAPTER 11

Walking for health: a practical guide

11

StepMine is more than a counter. It aims to help people walk in ways that are safe, enjoyable and sustainable. This chapter summarises the practical guidance that informs the app's tips and educational content.

11.1 Start where you are

The most important step is the next one. For someone who currently walks very little, adding a few short walks per day is a meaningful change. The evidence reviewed in Chapter 3 shows that the steepest health gains are at the low end of the activity range, so there is no need to aim for an ambitious target on day one. A sensible approach is to measure a typical week first, then set a goal about 1,000 to 2,000 steps above the current daily average and raise it gradually once it feels comfortable.

11.2 Build walking into the day

Most steps do not come from dedicated exercise but from daily life. Small changes add up quickly:

Everyday change	Approximate extra steps
A 10-minute walk after lunch	1,000 to 1,300
Getting off public transport one stop early	500 to 1,000
Taking stairs instead of the lift several times a day	200 to 500
Walking during phone calls	300 to 1,000
A 20-minute evening walk	2,000 to 2,600

Estimates assume a typical walking cadence of about 100 to 130 steps per minute and vary between individuals.

11.3 Pace and intensity

WHO recommends at least 150 to 300 minutes of moderate-intensity activity each week.[2] Brisk walking, at a pace that makes breathing noticeably faster while still allowing conversation, is a good example of moderate intensity. A simple self-check is the "talk test": during moderate activity you can talk but not sing. Walking at a comfortable, slower pace still counts toward daily steps and reduces sedentary time, which is beneficial in itself.[2]

11.4 Consistency over intensity

Health benefits are associated with habitual activity over months and years. A moderate amount of walking on most days is generally more sustainable than occasional bursts of very long walks. StepMine's weekly chart is designed to make consistency visible, and the daily reward encourages a short check-in several times a day.

11.5 Walking safely

- **Footwear.** Comfortable, supportive shoes reduce the risk of blisters and strain.
- **Hydration.** Drink water, especially in warm weather or on longer walks.
- **Visibility.** Wear bright or reflective clothing when walking near traffic in low light.
- **Weather.** In extreme heat, walk in the cooler parts of the day; in ice or snow, choose safe surfaces or walk indoors.
- **Attention.** Avoid looking at the phone while crossing roads. StepMine counts steps in the background, so there is no need to watch the screen while walking.
- **Listen to your body.** Stop and seek medical help if you experience chest pain, severe breathlessness, dizziness or fainting.

11.6 Walking for mind and mood

Physical activity is associated not only with physical health but also with mental wellbeing. The 2025 Lancet Public Health review reported lower risk of depressive symptoms at higher daily step counts.[4] Many people find that a short walk outdoors helps them reset after a stressful period. StepMine connects these ideas by suggesting a walk when the stress check shows a high result, and by letting users measure again afterwards to see how they feel.

11.7 Older adults

Adults over 60 are, on average, less active than younger adults.[1] They also stand to gain a great deal from regular walking: the 2022 Lancet Public Health meta-analysis found that, among adults aged 60 and older, the risk of death decreased progressively with more steps up to about 6,000 to 8,000 steps per day.[6] For older users, StepMine's adjustable goals, large clear numbers and simple screens make it easier to set realistic targets. Balance, strength and fall prevention are also important for older adults, who should consider activities that support them alongside walking, ideally with advice from a health professional.

11.8 People living with chronic conditions

For many people with long-term conditions such as type 2 diabetes or high blood pressure, regular walking is part of a healthy routine. These users may also benefit from StepMine's medication reminders. Anyone with a chronic condition should agree their activity plan with their doctor, particularly before significantly increasing intensity.

CHAPTER 12

Who StepMine is for

12

StepMine is designed for everyday people, not only for athletes. The following profiles illustrate how different users can benefit. They are illustrative examples, not real individuals or testimonials.

12.1 The busy office worker

Sits at a desk most of the day and rarely exceeds 4,000 steps. Does not want to buy a smartwatch or join a gym. With StepMine running quietly in the background, the progress ring makes the gap visible. Setting a goal of 6,000 steps and claiming the daily reward between meetings becomes a cue to stand up and take a short walk. The stress check after a tense meeting is a reminder that a walk around the block can help.

12.2 The older adult

Recently retired, walks to the shops but has no clear picture of daily activity. Takes blood pressure medication in the morning and evening. StepMine reminds them when to take each dose and lets them mark it as taken from the notification. A personal goal of 5,000 steps, raised gradually, gives structure to daily walks. Occasional heart rate checks provide general awareness, while any concern is discussed with their doctor.

12.3 The student

Walks a lot on some days and very little on others, and spends long evenings in front of screens. Likes the idea of earning STEP and invites friends using a referral code. The weekly chart reveals how much less active weekends are. Over time, a shared goal with friends turns into a habit of walking together.

12.4 The parent

Is constantly on the move but never knows how much. Has little time for self-care. StepMine counts every step of the school run, shopping and housework without any effort, and shows that the day's activity already meets the goal. The medication reminder helps them keep track of a child's or their own prescribed schedule.

12.5 The health-curious Web3 user

Already holds a self-custody wallet and is interested in transparent, community-owned reward systems. StepMine gives them a reason to move more today and, in the planned later stages, the

ability to link their wallet and claim eligible balances on-chain. For this user, the transparency commitments in Chapter 17 matter as much as the rewards themselves.

12.6 What these users have in common

Need	How StepMine responds
Simple, effortless tracking	Automatic hardware step counting, no session to start
A realistic target	Personal goal from 1,000 to 100,000 steps
Motivation today, not someday	Steps to STEP on app open, +5 STEP every two hours
Basic health awareness	Heart rate and stress checks with clear explanations
Help with routines	Offline medication reminders
Privacy	Health data stays on the device
Low cost	Free, works on the phone they already own

12.7 Who StepMine is not for

StepMine is not designed for clinical monitoring, for detecting or managing medical conditions, or for professional athletes who need precise training metrics. People who need medical-grade measurements should use devices and services intended for that purpose under professional supervision.

CHAPTER 13

Privacy, security and data ethics

13

Health apps hold some of the most personal information people have. StepMine's privacy model starts from a simple rule: if the server does not need it, the server does not get it.

13.1 Data minimisation

Data	Where it lives	Purpose
Heart rate readings	Device only	Show results and history to the user
HRV and stress readings	Device only	Show results and history to the user
Camera frames	Memory only, never saved	Compute the PPG signal during a measurement
Medication names, times, history	Device only	Fire reminders and track doses
Height, weight, step goal	Device only	Personalise estimates and progress
Daily step history	Device only	Ring, chart and profile statistics
Step totals submitted for rewards	Server	Validate and credit STEP
Name, email, profile photo URL	Server (Firebase Auth)	Sign-in and account identity
STEP balance, reward timestamps, referral code	Server	Rewards, cooldowns and referrals

13.2 No location tracking

StepMine does not request location permission and does not use GPS. Step counting relies entirely on the motion sensor. This is better for battery life and means the platform has no record of where users walk.

13.3 Security

- **Authentication** uses Google sign-in through Firebase Authentication. StepMine never sees or stores user passwords.
- **Server-side rules.** Reward balances cannot be written directly by the app. All changes go through Cloud Functions, which verify the signed-in user and apply every rule on the server.
- **Encryption in transit.** All communication between the app and Firebase uses encrypted connections.
- **Least privilege.** The app requests only the permissions it needs: physical activity, camera (for measurements), notifications, and alarm scheduling for reminders.

13.4 User control

Users can delete their account at any time from the profile screen. Deletion removes the user's account record and reward data from the server and deletes the authentication account. Data stored only on the device is removed when the app is uninstalled. A public page at stepmine.web.app explains the deletion process, and the privacy policy is published on the same site.

13.5 Advertising

StepMine shows a rewarded video advertisement only when the user chooses to claim the daily reward. Ads are never required to count steps or to convert steps to STEP. Health data is not shared with advertising partners. Advertising identifiers are handled in line with Google Play policies and the user's device settings.

13.6 Ethical commitments

- We will not sell personal health data.
- We will not use health readings to target advertising.
- We will describe health features honestly, including their limitations.
- We will never present StepMine as a medical device or a substitute for medical care.
- We will design rewards to encourage healthy behaviour, not compulsive use.

CHAPTER 14

The STEP reward model

14

STEP turns healthy movement into something visible and immediate. The model is intentionally simple, so that every user can understand exactly how they earn.

14.1 Earning overview

Source	Rule	Notes
Steps	1,000 steps = 1 STEP	Converted automatically on app open. Fractions are credited (for example, 2,450 steps = 2.45 STEP).
Daily reward	+5 STEP every 2 hours	Claimed after a short rewarded ad. Cooldown enforced on the server.
Walking tasks	Bonus on reaching daily targets	Requires the day's credited steps to meet the task goal.
Referrals	5% of a friend's rewards	Paid to the inviter on top of the friend's earnings, not deducted from them.

14.2 Steps to STEP

Steps accumulate on the device as pending steps. When the user opens the app, StepMine reads the latest counter value and sends the pending total, together with the current date, to the server. The server validates the claim (Chapter 15), credits the corresponding STEP, and returns the amount. The app then confirms with a brief message such as "+3.2 STEP added" and removes the credited steps from the pending total. If the network is unavailable, pending steps simply wait on the device until the next successful sync. Steps never expire on the device.

```
credited STEP = validated steps ÷ 1,000
```

14.3 The daily reward

The daily reward card inside the balance card lets users claim +5 STEP by watching a short rewarded video. After a successful claim, the server records the time and the next claim becomes available two hours later. The button shows a live countdown and a progress bar. When the reward becomes available again, StepMine can send a local notification. Because the cooldown is checked on the server, changing the phone's clock has no effect.

The daily reward is deliberately independent of steps, so that users who have had a less active day still have a reason to open the app, see their goal, and perhaps take a short walk.

14.4 Walking tasks

Tasks give users short-term goals within a day, such as reaching a daily step target. A task can be completed once per day, only after the server has credited enough steps for that day. Tasks reset each day.

14.5 Referrals

Each user has a personal referral code. A new user can enter a friend's code once. From then on, whenever the new user earns STEP, the inviter receives an additional 5% of that amount, funded from the community allocation. The invited user's own earnings are not reduced. The profile shows how many friends the user has invited and how much they have earned from referrals.

14.6 Displaying balances

Balances are shown with up to three decimal places, with trailing zeros removed, so that small amounts from partial steps are visible. Each credited amount is confirmed by a short message. The balance updates in real time from the server.

14.7 What STEP is today

> STEP is currently an in-app reward balance recorded in the user's StepMine account. It has no cash value and cannot be withdrawn, sold, transferred or exchanged. The planned on-chain transition is described in Chapters 16 and 17. Until that transition happens, and subject to its final terms, STEP should be understood purely as a measure of activity and participation within the app.

CHAPTER 15

Fair play and anti-abuse

15

A reward system is only meaningful if it is fair. StepMine enforces its rules on the server so that rewards reflect real movement by real people.

15.1 Server-side rules

Rule	How it works
Pace limit	Credited steps are capped at 250 steps per minute of elapsed time since the user's previous step claim (or since account creation). This is above any sustained human walking or running cadence, so honest users are unaffected, while bulk-injected step counts are rejected.
Claim spacing	Step claims arriving within 10 seconds of the previous claim are credited zero, which blocks rapid repeated requests.
Upper bound	A single claim is clamped to at most 1,000,000 steps before any other check.
Date check	The date sent with a claim must be within two days of the server's date, preventing claims against arbitrary days.
Reward cooldown	The +5 STEP daily reward can only be claimed once the server-recorded two-hour cooldown has passed.
Task verification	Tasks complete only if the server-side credited steps for that day meet the task goal, and each task can be completed once per day.
Referral integrity	A referral code can be applied once, users cannot refer themselves, and referral shares are calculated on the server.
Transactional writes	All balance changes run inside server transactions, so concurrent requests cannot double-credit.

15.2 Known risks

Because steps originate from the device, a determined attacker with a modified device could attempt to report steps that were never taken. The pace limit bounds the damage any single account can do, but it cannot distinguish real walking from simulated walking at a plausible pace. Mechanical step simulators can also generate movement without real walking.

15.3 Planned enhancements

- **App integrity verification** (for example Firebase App Check with Play Integrity) to confirm that requests come from a genuine, unmodified copy of the app on a genuine device.
- **Behavioural analysis** to flag statistically implausible patterns, such as identical step counts every hour or continuous stepping for unrealistic durations.
- **Daily credit ceilings** tuned to real-world walking distributions.
- **Pre-launch review** of balances before any on-chain claim, so that accounts found to have abused the system can be excluded from token distribution.

These measures will be strengthened before STEP becomes transferable, because the incentive to cheat grows when rewards gain external value.

CHAPTER 16

Web3 architecture

16

StepMine's long-term vision is that the value created by healthy activity should belong to the people who create it. Web3 technology offers a way to give users true ownership of their rewards.

16.1 Why Web3 for a health platform?

In most digital platforms, points and rewards live entirely inside the company's database. Users cannot take them elsewhere, and their value depends wholly on the platform's decisions. A public blockchain changes this in three ways:

- **Ownership.** Tokens held in a self-custody wallet are controlled by the user's own keys.
- **Transparency.** Total supply, allocations and token movements can be verified publicly by anyone.
- **Portability.** Tokens can interact with other applications and services that support the same standard.

For StepMine, Web3 is a means, not an end. The chain layer exists to make the reward system more transparent and more user-owned. It does not change the health-first nature of the app, and health data will never be written to a blockchain.

16.2 What goes on-chain, and what never does

On-chain (planned)	Never on-chain
STEP token contract and total supply	Heart rate, HRV and stress readings
Allocation wallets	Medication data
Claims of earned balances to user wallets	Height, weight and goals
Liquidity pool	Step history and location
	Name and email

16.3 Planned network

BNB Chain is the planned launch network for on-chain STEP. It offers low transaction fees, fast confirmation times, compatibility with the Ethereum Virtual Machine, and broad support across wallets and decentralised exchanges. Low fees matter for StepMine in particular, because many users will hold modest balances earned through everyday walking, and claiming them should not cost more than they are worth. The final choice of network will be confirmed before launch.

16.4 Staged architecture

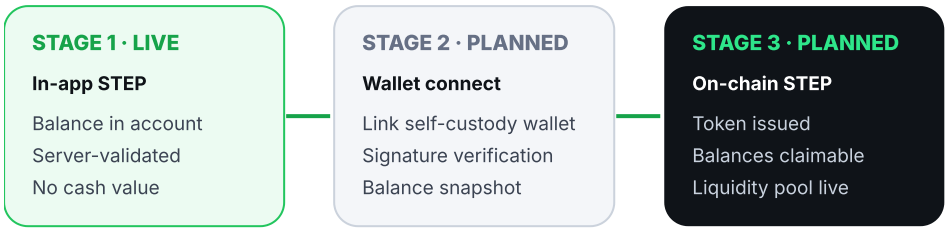


Figure 16.1 · From points to ownership in three stages.

Stage 1: In-app STEP (live)

Users earn STEP through steps, daily rewards, tasks and referrals. Balances are stored in the user's account and every change is validated by Cloud Functions. This stage allows the reward economy, fair-play rules and user experience to mature before any token exists.

Stage 2: Wallet connect (planned)

Users will be able to link a self-custody wallet address to their StepMine account. Ownership of the address will be proven by signing a message with the wallet, so that no private keys are ever shared with StepMine. Connection will be optional. Users who do not connect a wallet will continue to use StepMine exactly as before.

Stage 3: On-chain STEP (planned)

The STEP token will be deployed with a fixed total supply of 10,000,000,000, distributed according to the allocation in Chapter 17. Users with linked wallets will be able to claim their eligible in-app balances to their wallets. Claim mechanics are expected to use a gas-efficient method, such as a Merkle-tree-based claim contract, in which the server publishes a verifiable list of eligible balances and each user claims their own amount. The liquidity pool allocation will be used to establish initial on-chain liquidity.

16.5 Smart contract principles

- **Standard and simple.** A standard fungible token implementation (BEP-20 on BNB Chain), avoiding unnecessary complexity.
- **Fixed supply.** The full supply is created at deployment. No function will allow additional tokens to be minted beyond the 10,000,000,000 cap.
- **Published addresses.** Contract and allocation wallet addresses will be published on the StepMine website.
- **Independent review.** Contracts are intended to undergo an independent security review before deployment, and the results will be shared publicly.

16.6 Health first, always

The introduction of a token creates new incentives, including incentives to cheat. StepMine will not launch on-chain STEP until the anti-abuse measures in Chapter 15 have been strengthened. The health features of the app will remain free and fully usable without a wallet, without a token and without ever watching an ad.

CHAPTER 17

Tokenomics

17

STEP's token design reflects StepMine's mission: the people who move should own most of the value their movement creates.

17.1 Supply and allocation

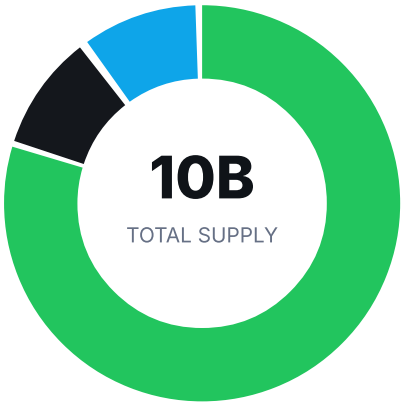


Figure 17.1 · STEP allocation.

Allocation	Share	STEP
Community	80%	8,000,000,000
Team	10%	1,000,000,000
Liquidity pool	10%	1,000,000,000
Total	**100%**	**10,000,000,000**

17.2 Community: 80%

The community allocation of 8,000,000,000 STEP is reserved for users. It funds:

- Step rewards at the rate of 1 STEP per 1,000 validated steps.
- The +5 STEP daily reward.
- Walking task bonuses.
- The 5% referral share paid to inviters.
- Future community programmes such as health challenges and events.

Community STEP enters circulation through activity, not through sales. This means distribution follows healthy behaviour: the more people walk, the more of the supply reaches them.

17.3 Team: 10%

The team allocation of 1,000,000,000 STEP supports the people who design, build, secure and maintain StepMine, including future health features, platform infrastructure and security reviews. Release terms for the team allocation will be published before the on-chain launch.

17.4 Liquidity pool: 10%

The liquidity allocation of 1,000,000,000 STEP is reserved for establishing an on-chain liquidity pool at launch, so that the token can be held and transferred with a functioning market from the start. Details of how the pool will be created and managed will be published before launch.

17.5 Emission and sustainability

Because the community allocation is finite, the rate at which STEP is earned must be sustainable over many years. Some simple illustrations help put the 8,000,000,000 community allocation in perspective:

Scenario (illustrative only)	Approx. STEP per year
One user walking 7,000 steps every day	≈ 2,555 from steps
One user also claiming the daily reward 6 times a day	≈ 10,950 from daily rewards
100,000 such users	≈ 1.35 billion

These figures are illustrations, not forecasts. They show that daily rewards, rather than steps, are the largest potential source of emissions in the current model. To keep the community allocation sustainable as the user base grows, StepMine reserves the ability to adjust reward rates, cooldowns, task bonuses and other parameters, with changes announced in advance. The conversion rate of 1,000 steps to 1 STEP is the core of the model and is intended to remain the reference point.

17.6 Utility

STEP is first and foremost a measure of activity and participation. Possible future uses that the team is exploring include access to premium health content and challenges, community governance votes on platform priorities, and partner programmes with health and wellness services. These are possibilities, not commitments, and any new use will be evaluated against StepMine's health-first principles and applicable laws.

17.7 Transparency commitments

- Total supply, contract address and allocation wallet addresses will be published.
- Release terms for the team and liquidity allocations will be published before launch.
- Material changes to reward parameters will be announced in advance.

> The allocation described here is planned and may change before launch. STEP is not designed or marketed as an investment. Nothing in this chapter is a promise of price, return, profit or liquidity.

CHAPTER 18

Community and governance

18

A health movement is built by its members. StepMine aims to give its community a growing voice in how the platform develops.

18.1 Community today

Every StepMine user is part of the community from their first step. The referral system lets users bring friends and family into healthier routines. Feedback from users shapes the roadmap, from which health tools are built next to how results are explained.

18.2 Toward community governance

After the on-chain launch, StepMine intends to explore lightweight governance mechanisms through which STEP holders can signal preferences on questions such as which health features to prioritise, which community challenges to run and how community programmes are structured. Governance will begin with advisory, non-binding votes and will expand only as the community and the legal environment allow. Matters of user safety, privacy, security and legal compliance will remain the responsibility of the StepMine team.

18.3 Health partnerships

StepMine welcomes collaboration with researchers, health educators and wellness organisations who share its commitment to evidence-based, privacy-respecting health promotion. Any partnership will be announced publicly, and StepMine will never imply endorsement by an organisation that has not given it.

CHAPTER 19

Roadmap

19

The roadmap is organised in phases rather than fixed dates, because quality, security and user safety come before speed.

Phase	Status	Milestones
Foundation	Completed	Native Android app. Hardware step counting with background sync. Google sign-in. Server-validated STEP rewards. Daily reward with server cooldown. Referrals and tasks. Account deletion.
Health tools	Completed	Camera heart rate (30 s). Stress and HRV check (60 s). Medication reminders. Personal daily goal, height and weight. Results with explanations and history.
Launch	In progress	Closed testing and public release on Google Play. Website and documentation. App integrity verification.
Growth	Planned	Localisation into more languages. Community health challenges. Expanded health education content. iOS version.
Wallet	Planned	Optional self-custody wallet linking with signature verification. Strengthened anti-abuse review.
On-chain STEP	Planned	Smart contract security review. STEP deployment on BNB Chain. Claims of eligible balances. Liquidity pool.
Community	Planned	Advisory governance votes. Partner programmes with health and wellness services.

The roadmap may change in response to user feedback, technical findings, security reviews, platform policies and legal requirements. Updates will be published on the StepMine website.

CHAPTER 20

Risks and limitations

20

Honest communication about risks is part of building trust. Readers should consider the following before engaging with StepMine or STEP.

20.1 Health and measurement risks

- StepMine is not a medical device. Readings are estimates and may be inaccurate because of device hardware, movement, finger placement, lighting, skin temperature, irregular heart rhythms or other factors.
- Health information in the app is general and may not apply to a particular user's situation.
- Increasing physical activity is safe for most people, but people with heart conditions, recent surgery, pregnancy complications or other health concerns should talk to a doctor before significantly changing their activity.
- Rewards could encourage some users to overexert themselves. Users should listen to their bodies and rest when needed.

20.2 Technical risks

- Step counting depends on phone hardware and the Android operating system, and may vary between devices or be affected by system updates and battery optimisation settings.
- Cloud services may experience outages, during which rewards cannot be credited until service resumes.
- Smart contracts, wallets and blockchains carry risks of software bugs, exploits and network disruption. Users are responsible for the security of their own wallets and keys.

20.3 Reward and token risks

- STEP currently has no monetary value and may never acquire one.
- The on-chain launch may be delayed, changed or cancelled.
- Reward parameters may change to protect the sustainability of the community allocation.
- If STEP becomes transferable, its market price, if any, could be highly volatile, and holders could lose all value.
- Accounts found to have abused the reward system may be excluded from rewards and claims.

20.4 Regulatory risks

Laws and regulations relating to digital assets, health apps, data protection, advertising and consumer protection are evolving and differ between countries. Regulatory developments could re-

quire StepMine to change, restrict or discontinue features, including the on-chain roadmap, in some or all jurisdictions. App store policies may also restrict how rewards and tokens can be presented or used within the app.

20.5 Project risks

StepMine is an early-stage project. Its success depends on adoption, continued development and the team's ability to operate the platform sustainably. There is no guarantee that the roadmap will be delivered in full.

> **Our commitment**
>
> Whatever happens to the reward layer, StepMine's core purpose remains the same: to help people walk more, understand their bodies better and look after their health, using the phone they already own.

APPENDIX A

A

Glossary

Term	Meaning in this whitepaper
Active minutes	An estimate of time spent walking, derived from daily steps and a typical walking cadence.
Adherence	The extent to which a person takes medication as agreed with their healthcare provider.
All-cause mortality	Death from any cause during a study's follow-up period.
Autonomic nervous system	The part of the nervous system that regulates involuntary functions such as heart rate, breathing and digestion. It has sympathetic and parasympathetic branches.
BEP-20	The standard for fungible tokens on BNB Chain, compatible with the widely used ERC-20 standard.
BNB Chain	A public blockchain compatible with the Ethereum Virtual Machine, planned as STEP's launch network.
Cadence	The number of steps taken per minute.
Claim	The process by which a user transfers an eligible in-app STEP balance to their own wallet after the on-chain launch.
Cloud Functions	Server-side code that runs in Google's cloud. StepMine uses it to enforce every reward rule.
Cohort study	An observational study that follows a group of people over time to see how exposures, such as daily steps, relate to outcomes, such as disease.
Community allocation	The 80% of the STEP supply reserved for users and distributed mainly through verified activity.
Confidence interval (CI)	A range of values that expresses the uncertainty around a statistical estimate.
Cooldown	The waiting period between daily reward claims, currently two hours, enforced by the server.
Daily reward	A +5 STEP reward claimable after a short rewarded ad, once per cooldown period.

Hazard ratio (HR)	A measure comparing the rate of an event, such as death, between two groups. An HR of 0.53 means a 47% lower rate.
Heart rate variability (HRV)	The variation in time between consecutive heartbeats, influenced by the autonomic nervous system.
Inter-beat interval (IBI)	The time between two consecutive heartbeats, usually in milliseconds.
Liquidity pool	A pool of tokens in a decentralised exchange contract that allows tokens to be exchanged. 10% of STEP supply is reserved for this purpose.
Merkle tree	A data structure that allows many balances to be committed in a single value, so each user can prove and claim their own balance efficiently.
Meta-analysis	A statistical method that combines results from multiple studies to produce an overall estimate.
Moderate-intensity activity	Activity that noticeably raises breathing and heart rate, such as brisk walking.
Noncommunicable disease (NCD)	A chronic disease not passed from person to person, such as cardiovascular disease, cancer or diabetes.
Pace limit	The server rule that caps credited steps at 250 per minute of elapsed time.
Pending steps	Steps counted on the device but not yet converted to STEP.
Photoplethysmography (PPG)	An optical technique that detects blood volume changes in tissue using light.
Present bias	The tendency to weigh immediate costs and benefits more heavily than future ones.
Referral share	The additional 5% of a friend's rewards credited to the user who invited them.
RMSSD	Root mean square of successive differences between heartbeats, a common short-term HRV measure.
Sedentary behaviour	Time spent sitting or lying with low energy expenditure while awake.
Self-custody wallet	A crypto wallet whose private keys are controlled only by the user.
STEP	StepMine's reward unit. Currently an in-app balance with no cash value; planned to become an on-chain token.

Step counter sensor	A low-power hardware sensor in Android phones that counts steps since the last reboot.

APPENDIX B

Frequently asked questions

B

Does StepMine drain my battery?

No. StepMine reads the phone's low-power hardware step counter periodically rather than processing sensor data continuously, and it never uses GPS.

Do I need to keep the app open?

No. Steps are counted all day by the phone's hardware, even when StepMine is closed. When you open the app, your new steps are added and converted to STEP.

What happens to my steps if I have no internet?

They wait safely on your device as pending steps and are converted the next time the app connects.

Why do I need to watch an ad for the daily reward?

The rewarded ad helps fund the platform. It is always optional and is only used for the daily reward. Step counting, step conversion and all health tools work without ads.

Is the camera heart rate accurate?

Research shows that smartphone finger PPG generally agrees well with validated methods for resting heart rate in adults when measured correctly. Results can be affected by movement, finger pressure and lighting. The feature is for general wellness, not medical diagnosis.

Can StepMine detect heart problems?

No. StepMine is not a medical device and cannot detect, diagnose or monitor any medical condition. If you have symptoms or concerns, contact a healthcare professional.

Is my health data shared with anyone?

No. Heart rate, stress, medication, body measurements and step history stay on your device. Only your account details and step-based reward data are stored on the server.

How do I delete my account?

Open the app, go to Profile and tap Delete account. Your account and reward data are removed from the server.

Can I sell or withdraw STEP?

Not at this time. STEP is an in-app balance with no cash value. On-chain STEP is planned; its availability, timing and terms will be announced separately.

Will my in-app STEP become tokens?

The plan is for eligible in-app balances to become claimable to a linked wallet when on-chain STEP launches. Eligibility will depend on the final terms, including fair-play review. This is a plan, not a guarantee.

Why BNB Chain?

Low fees and fast confirmation make it practical for users to claim modest balances earned through everyday walking. The final network will be confirmed before launch.

What is the total supply of STEP?

The planned total supply is 10,000,000,000 STEP: 80% community, 10% team, 10% liquidity pool.

What if someone cheats?

Rewards are validated on the server with pace limits, cooldowns and transactional checks. Further integrity checks are planned before STEP becomes transferable, and accounts found to have abused the system may be excluded.

Is StepMine available on iPhone?

StepMine currently targets Android. An iOS version is part of the growth phase of the roadmap.

How many steps should I aim for?

It depends on your starting point, age and health. Research suggests meaningful benefits from moving from very low step counts toward about 7,000 steps per day, with additional benefits for some outcomes beyond that. Set a realistic personal goal and increase it gradually, and talk to your doctor if you have health conditions.

CHAPTER 21

References

21

1. World Health Organization. Nearly 1.8 billion adults at risk of disease from not doing enough physical activity. News release, 26 June 2024. Based on: Strain T, et al. National, regional, and global trends in insufficient physical activity among adults from 2000 to 2022. The Lancet Global Health, 2024.
2. World Health Organization. WHO guidelines on physical activity and sedentary behaviour. Geneva: WHO; 2020.
3. World Health Organization. Global status report on physical activity 2022. Geneva: WHO; 2022.
4. Ding D, Nguyen B, Nau T, et al. Daily steps and health outcomes in adults: a systematic review and dose-response meta-analysis. The Lancet Public Health, 2025. doi:10.1016/S2468-2667(25)00164-1.
5. Mitchell MS, Orstad SL, Biswas A, et al. Financial incentives for physical activity in adults: systematic review and meta-analysis. British Journal of Sports Medicine. 2020;54(21):1259–1268.
6. Paluch AE, Bajpai S, Bassett DR, et al. Daily steps and all-cause mortality: a meta-analysis of 15 international cohorts. The Lancet Public Health. 2022;7(3):e219–e228. doi:10.1016/S2468-2667(21)00302-9.
7. University of Sydney. Rethink the 10,000-a-day step goal, study suggests. News release, 24 July 2025.
8. De Ridder B, Van Rompaey B, Kampen JK, Haine S, Dilles T. Smartphone apps using photoplethysmography for heart rate monitoring: meta-analysis. JMIR Cardio. 2018;2(1):e4. doi:10.2196/cardio.8802.
9. Mather JD, Hayes LD, Mair JL, Sculthorpe NF. Validity of resting heart rate derived from contact-based smartphone photoplethysmography compared with electrocardiography: a scoping review and checklist for optimal acquisition and reporting. Frontiers in Digital Health. 2024;6:1326511.
10. Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology. Heart rate variability: standards of measurement, physiological interpretation, and clinical use. Circulation. 1996;93(5):1043–1065.
11. Shaffer F, Ginsberg JP. An overview of heart rate variability metrics and norms. Frontiers in Public Health. 2017;5:258.
12. Android Developers. Motion sensors: Sensor.TYPE_STEP_COUNTER. Android documentation.
13. Kim HG, Cheon EJ, Bai DS, Lee YH, Koo BH. Stress and heart rate variability: a meta-analysis and review of the literature. Psychiatry Investigation. 2018;15(3):235–245.
14. World Health Organization. Adherence to long-term therapies: evidence for action. Geneva: WHO; 2003.
15. Brown MT, Bussell JK. Medication adherence: WHO cares? Mayo Clinic Proceedings. 2011;86(4):304–314. doi:10.4065/mcp.2010.0575.
16. Mathes T, Pieper D, Antoine SL, Eikermann M. 50% adherence of patients suffering chronic conditions – where is the evidence? German Medical Science (GMS). 2012. PMC3525884.

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