Telkom Digihack 2025
AI for Good: Empowering Innovation
with Telkom Group

Predictive Digital Healthcare Track

BREATHY: Democratizing Access to Inclusive and Predictive ISPA Care through AI-Powered Digital Health Companion

by **WeCare** Team
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CHAPTER 1: BACKGROUND

Indonesia, the sixth most populous country in the world, carries a heavy respiratory health burden due to worsening air quality, rapid urbanization, and unequal access to healthcare. Acute Respiratory Infections (ISPA) are among the most common and persistent diseases, consistently ranking as one of the top reported illnesses nationwide.

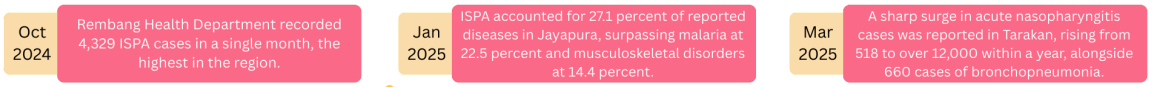

***Figure 1**. 2024-2025 ISPA Cases in Indonesia from Various Cities*

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ISPA refers to an acute infection affecting one or more parts of the respiratory tract, from the nose to the alveoli. Sometimes it involves related structures such as the sinuses, middle ear cavity, and pleura. The condition typically lasts up to 14 days and can involve both the upper and lower respiratory tracts.

In 2023, the national prevalence of ISPA was recorded at 9.3%, or approximately 26 million Indonesians affected at any given time. The highest incidence occurred in children aged 1–4 years (13.7%), making them the most vulnerable group (Ministry of Health, 2023). Regional reports also show significant variation, such as Bali where certain districts like Buleleng and Kuta reported the highest prevalence.

The burden extends beyond health. Respiratory illnesses generate over 1.1 million outpatient cases and contribute to more than Rp13 trillion annually in inpatient claims for BPJS Health. Yet access to care remains uneven: Indonesia has ~17,500 registered community health centers (puskesmas), many of which lack complete medical staff, while hospitals (~3,200 nationwide) face chronic overcrowding in urban areas.

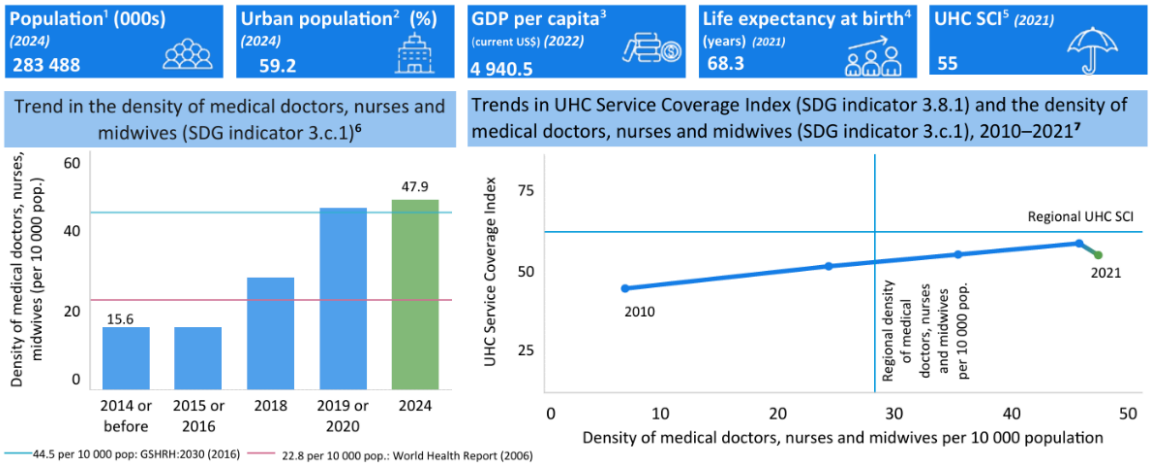


***Figure 2**. Trends In Density of Medical Doctors, Nurses, and Midwives (WHO, 2023)*

These challenges are compounded by self-diagnosis and self-medication, which often result in antibiotic misuse and delayed treatment. Mild cases flood hospitals while severe cases arrive late, straining clinical capacity and escalating costs.

At the same time, Indonesia's 79.5% internet penetration (APJII, 2024) and over 112 million WhatsApp users present a unique opportunity for digital health innovation. By leveraging these accessible platforms, digital triage and guided care can expand reach to underserved communities and optimize the healthcare system

***Figure 3**. Chat Media Trends in 2024 (APJII, 2024)*

This is where Breathy comes in: an AI-powered companion that integrates sputum and throat image analysis, conversational triage, and doctor verification into a structured care pathway. Breathy has the potential to reduce unnecessary hospital visits, improve early detection, optimize BPJS costs, and support antibiotic stewardship, making ISPA care more inclusive, efficient, and effective for all Indonesians.

In short, ISPA is not only a persistent health problem but also a systemic challenge that requires innovative, scalable, and inclusive digital solutions. Breathy aims to transform this landscape by integrating healthcare accessibility, cost-efficiency, and preventive public health measures into a single, easy-to-use platform.

CHAPTER 2: INTRODUCING, BREATHY!

In alignment of our concern of ISPA in Indonesia, We are proud to introduce Breathy! Breathy is an AI-powered digital health companion for respiratory infections (ISPA), accessible through both WhatsApp and the web. It is designed to reach every layer of society and make democratizes predictive ISPA care across Indonesia. By leveraging platforms that are already embedded in our daily life, Breathy eliminates the barriers of access that ensures even remote and underserved communities can connect to timely respiratory healthcare.

1.1. From Interaction to Insight and Care

***Figure 4**. Breathy Usage Demo*

The experience begins simply when a user or caregiver starts a chat with breathy, answer short guided questions, and uploads supporting photos such the throat or sputum,From there, Breathy's AI analyzes both image and symptom inputs as a preprocessing step to pre-diagnose the user's conditions and classify severity into mild, moderate, or severe.

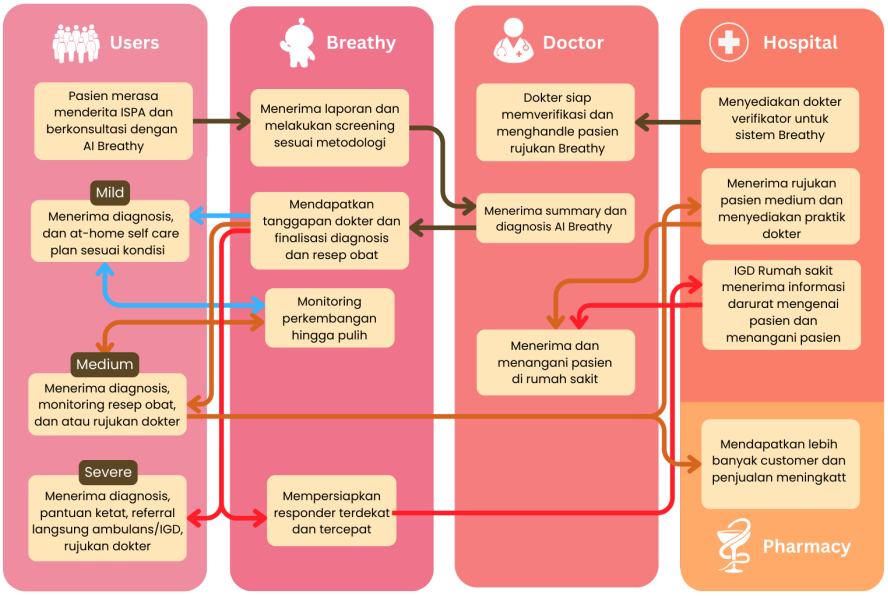


***Figure 5**. Breathy System Flow*

It moves seamlessly to a doctor's dashboard where the information is presented in a structured and digestible format for the doctors to symptoms, preliminary severity assessment, and AI diagnosis. Here, doctors act as the human-in-the-loop, validating the case, adjusting the assessment if needed, and deciding on a safe referral pathway. Based on their decision, Breathy guides the user to the right next step. Which are structured self-care with monitoring from Breathy, referral to a pharmacy, or immediate hospital attention.

All records are synchronized with the web portal, so users can log in with their number to track their care journey. To ensure continuity, Breathy follows up daily until the user reports recovery, while mapping features direct urgent cases to the nearest facilities. This combination of automation, doctor verification, structured referrals, and follow-up care ensures that ISPA management becomes accessible, affordable, and inclusive for everyone.

1.2. Features and Innovation at the Heart of Breathy

Breathy is not your average telemedicine service that ends with video calls or static symptom chats hidden behind paywalls. It is a complete ISPA care companion where conversational triage is only one component within a fully integrated pathway that spans

automated screening, clinician verification, structured referrals, and continuous daily follow up. At its core lies an AI preprocessing engine that transforms multimodal input into structured clinical signals before a doctor ever reviews the case. This front-loading of analysis enables scale without compromising safety, because every case still passes through a human-in-the-loop verification stage. These innovations come to life through a set of tightly integrated features that together make Breathy a true digital health companion;

1.2.1 Conversational Triage Bot

Breathy's triage starts with a conversational bot on WhatsApp and the web that drives the dialogue step by step. Instead of passive forms, it asks targeted questions, adapts in real time, and collects text, and images with intent recognition ensuring clinical precision.

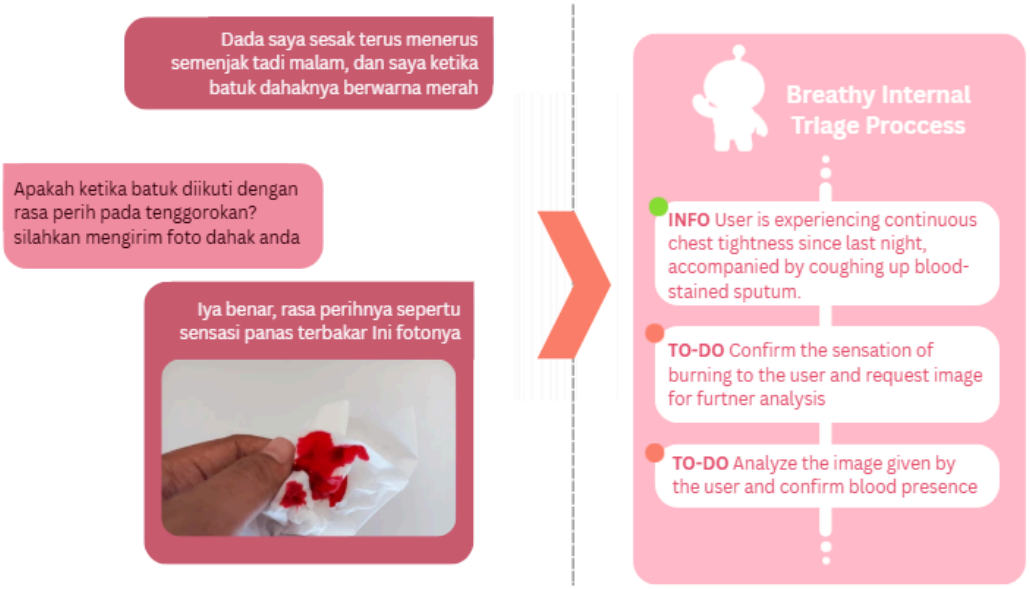


***Figure 6**. Breathy's Internal Triage Process*

This active, adaptive flow makes the interaction effortless for users while generating structured, high-quality data for the AI engine. This means;

- The bot understands context, so a mention of "difficulty breathing" triggers follow-up on frequency and severity rather than generic questions.
- Each reply shapes the next prompt, guiding a cough case differently from a throat photo submission.

1.2.3 Image Analysis for Early Detection

Photos of throat or sputum are processed through a vision pipeline that enhances quality, isolates regions of interest, and applies convolutional models trained to detect inflammation and exudate. The system outputs confidence-scored findings with visual heatmaps, turning ordinary phone images into actionable clinical signals. By embedding explainability and error checks, Breathy brings diagnostic rigor that ordinary telemedicine lacks.

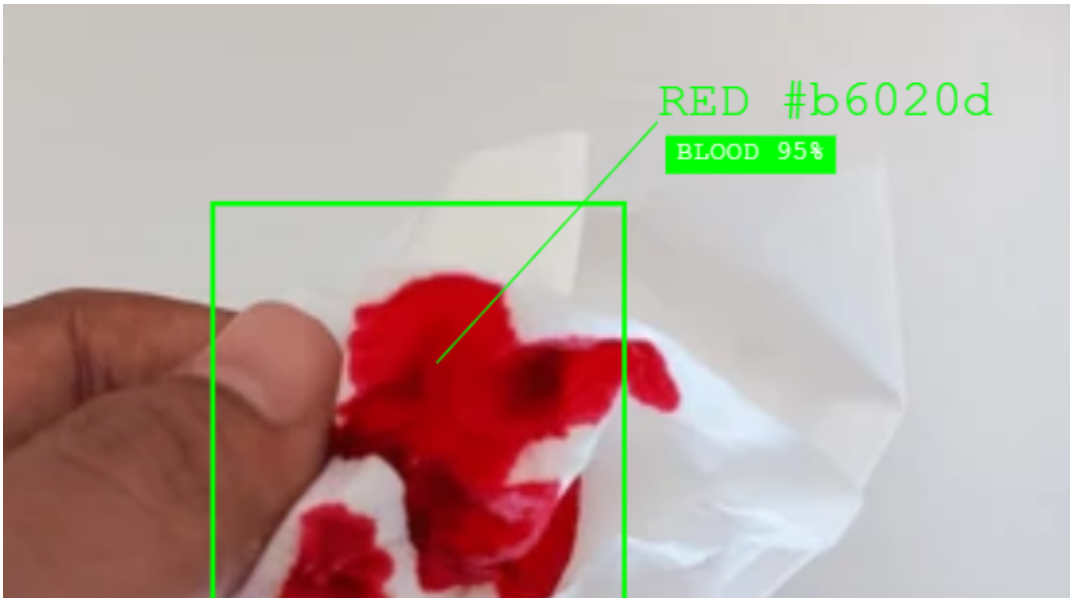


***Figure** 7. Image Analysis Example: Blood Stained Sputunm*

1.2.4 Symptom NLU (Natural Language Understanding)

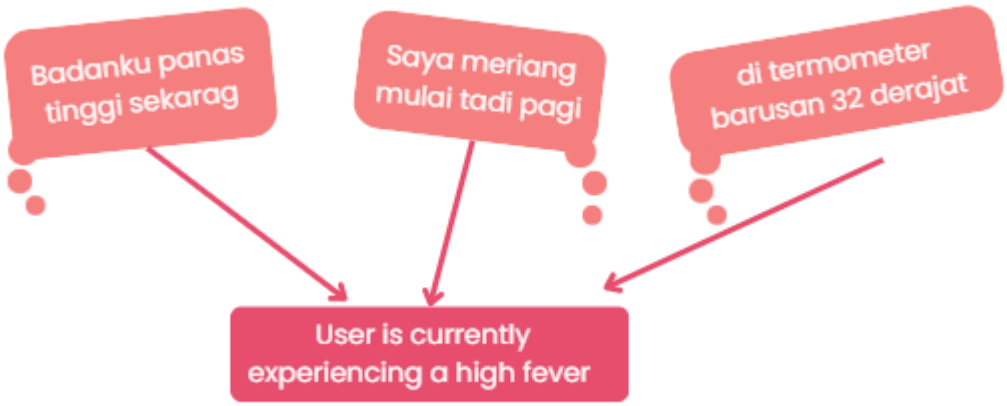


Figure 8. NLU Illustration

Breathy's NLU engine converts conversational input into structured medical variables such as symptom duration, fever patterns, dyspnea, and comorbidities. It distinguishes subtle differences in phrasing, normalizes entities, and produces interoperable profiles that feed directly into triage. This creates a clinically reliable record without forcing users through rigid questionnaires.

1.2.5 Doctor Verification Dashboard

Doctors review AI-preprocessed cases on a dashboard that summarizes key entities, severity predictions, heatmaps, and confidence levels. They can approve, adjust, or escalate with full traceability, supported by audit logs and batch workflows. This structure allows high-volume supervision without sacrificing accountability or clinical rigor.

1.2.6 Referral Orchestration with Geolocation Awareness

When escalation is needed, Breathy automatically generates structured referrals to pharmacies or hospitals based on patient location and partner availability. Referral notes carry clinical context so facilities receive patients with actionable information. This transforms referrals from a manual afterthought into a seamless extension of the care pathway.

- The system identifies the closest pharmacy or hospital within the partner network and users are directed to facilities that are both nearby and equipped to handle their condition.
- Each referral is auto-populated with doctor-approved AI-preprocessed data, including symptom history, image analysis findings, and severity classification, giving receiving facilities a heads up about the patient's condition.

1.2.7 Patient Follow-Up Engine

Breathy sustains care with automated daily check-ins tailored to triage level. Mild cases receive reminders, moderate cases trigger escalation checks, and severe cases prompt high-frequency monitoring.

***Figure 9**. Patient Daily Care for Mild Cases*

User responses are parsed in real time, and deterioration is flagged instantly. This ensures continuity until recovery, embedding long-term care where telemedicine usually stops.

1.3. Development Approach and Methodology

Breathy's development pathway is structured to deliver a clinically validated MVP through rapid iteration, ethical data practices, and embedded safety mechanisms. The approach leverages agile sprints, cloud-native integration with Azure services, and continuous doctor-in-the-loop validation so that technical progress and clinical oversight evolve in lockstep. The aim is to create not just a prototype but a scalable digital health companion with measurable performance targets and auditable safety controls.

1.2.1 Agile development approach

Breathy will be developed using an Agile methodology that emphasizes flexibility and continuous feedback. Work will be organized in sprints within Q1-Q2, with each sprint starting from a clear product backlog and ending with a tangible increment that can be reviewed together with stakeholders. Acceptance criteria will be set in advance so

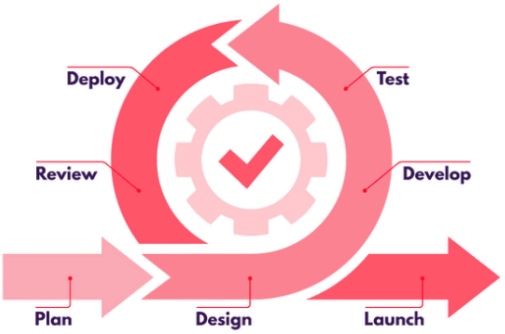


***Figure 10**. Agile Methodology*

(Simublade, 2024)

that every feature delivered is measurable and aligned with user needs. Sprint reviews will not only test functionality but also invite feedback from doctors to ensure that clinical perspectives directly shape priorities. By iterating in short cycles, the team can quickly adapt to changing requirements, refine the user experience, and keep development closely aligned with the realities of healthcare practice.

1.2.1.1 Stage 1 - Plan

- *Needs analysis*: Map ISPA challenges such as late diagnosis, uneven access, and weak follow-up.
- *Goal setting*: Align objectives with national health priorities (early detection, reduced hospital load, inclusivity).
- *Backlog creation*: Define and rank core features such as triage bot, AI preprocessing, doctor dashboard, referral engine, follow-up system.

1.2.1.2 Stage 2 - Design

- *System modeling*: Flowcharts of data from WhatsApp input to AI inference and doctor verification.
- *Database design*: PostgreSQL for structured cases, encrypted Blob Storage for images.
- *Interface wireframes*: Conversation flows and dashboard mockups validated by clinicians for usability and speed.

1.2.1.3 Stage 2 - Develop

- *Module build*: Core components (bot, preprocessing, inference) implemented as microservices.
- *System integration*: API gateway and orchestration to connect modules into a functional pipeline.
- *MVP delivery*: End-to-end workflow tested FROM user input, AI triage, doctor verification, referral issued.

1.2.2 Data collection plan and ethical safeguards

Since no large-scale ISPA dataset exists, Breathy begins with a Phase 0 consent pilot. Users provide explicit consent through the bot interface using informed

consent scripts, which are logged digitally before any data capture. Collected throat and sputum images, along with structured symptom responses, will be encrypted in transit using TLSS and stored in Azure Blob Storage with Role-Based Access Control (RBAC). Personally Identifiable Information (PII) and Protected Health Information (PHI) are stripped during ingestion, leaving only anonymized datasets for training.

CHAPTER 3: TECHNOLOGY & IMPLEMENTATION

Breathy's technology layer is designed to be both robust and lean, capable of scaling across Indonesia while staying safe, auditable, and user-friendly. The architecture is hosted on Azure, with clear pipelines for data, AI inference, clinical verification, and operational monitoring.

3.1 System Architecture

Breathy operates through a robust architecture hosted on Azure, where each component is optimized for modularity and scalability. A user begins by chatting through WhatsApp, powered by Azure Communication Services. Messages and images are handled by an ingestion service, passed into a queue, and routed through preprocessing before AI inference occurs.

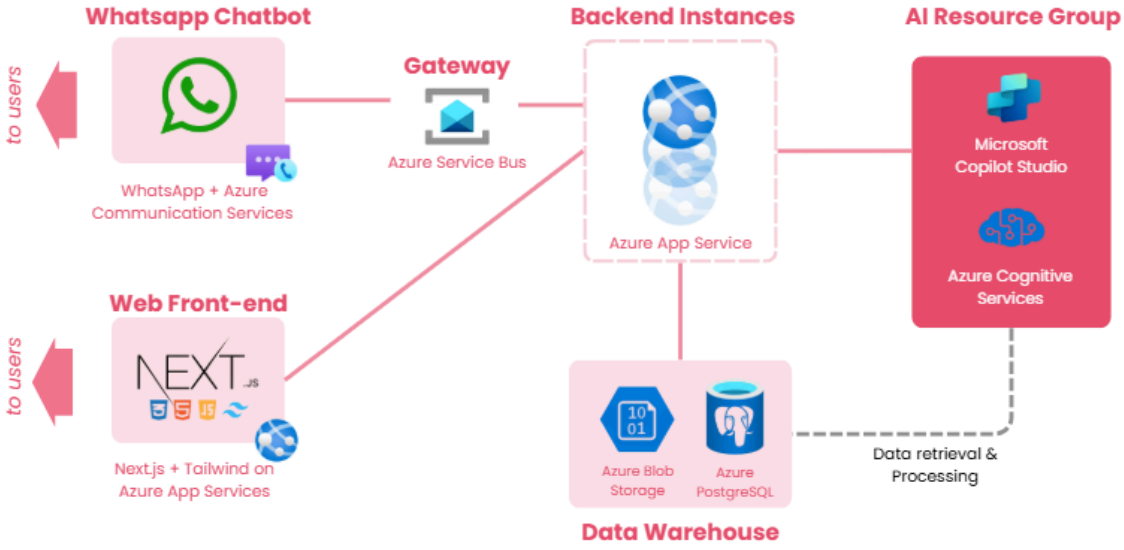


***Figure 11**. Breathy Complete System Architecture*

The inference layer combines computer vision and natural language models to produce a severity classification. These results are consumed by the triage engine and surfaced on a web-based doctor dashboard. All metadata is stored in Azure PostgreSQL, while encrypted media is saved in Azure Blob Storage. Notifications return to the user through the bot, closing the loop.

Component	Breathy Technology Usage	Function
Chat Interface	Azure Communication Services (WA)	Ingest messages and media
AI Inference	Azure Copilot Studio Azure Cognitive Services	Image + NLU model inference + Image Analysis
Database	Azure PostgreSQL	Case and metadata storage
Blob Storage	Azure Blob Storage	Photo storage
Dashboard	Next.js	Doctor verification interface and user chatbot interface
Queue	Azure Service Bus	Buffer and scale transactions
Monitoring	Azure Monitor	Monitor the application

***Figure 12**. Table Technology Specification*

3.2 Breathy Data Pipeline

Breathy processes three types of user inputs, which are free-text responses, structured responses, and image uploads. A data pipeline transforms these raw inputs into valid clinical signals while maintaining quality and security. The pipeline ensures that each interaction can be processed, stored, and retrieved for chatbot functions and doctor dashboards. All inputs are first captured as raw data and directed to different pathways as follows;

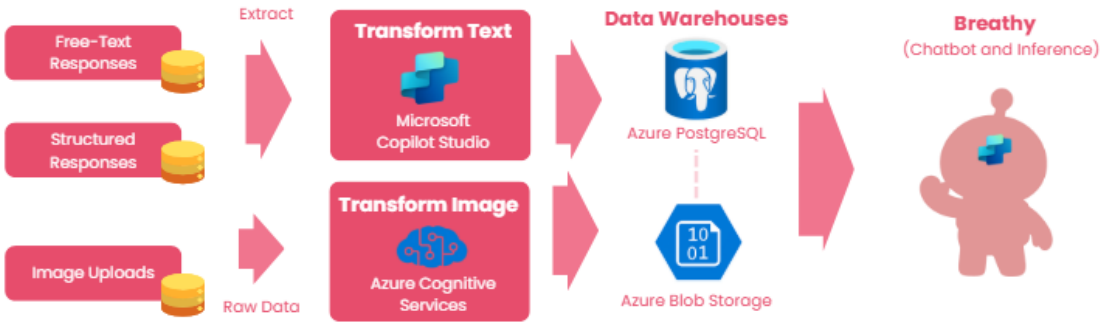


***Figure 13**. Input Processing Diagram*

- The text pipeline with Copilot Studio converts natural language into structured variables. User entries describing symptoms, duration, fever, or comorbidities are parsed with Natural Language Understanding. Values are normalized, such as “three days” to onset_days = 3, and mapped into a case schema. The structured

dataset is stored in Azure PostgreSQL for querying, aggregation, and workflow routing

- The image pipeline with Cognitive Services processes throat and sputum photos. Each file is checked for blur, brightness, and aspect ratio.
    - Failed images trigger an automated resubmission request from breathy
    - Valid images are cropped, enhanced, and analyzed to extract features and generate heatmaps with confidence scores.

  Results are stored in Azure Blob Storage with role-based access control and metadata linking

All validated outputs are stored under a unique case ID, with text data in Azure PostgreSQL and encrypted images in Blob Storage. **Breathy AI can retrieve them anytime via APIs**, combining structured fields and image metadata into one record. This design ensures secure multimodal storage, real-time access, and scalable delivery of insights to doctors and patients.

3.3 Artificial Intelligence Screening Workflow

3.3.1 Image Inference

Image inference in Breathy relies on automated quality control followed by clinical feature extraction. Azure Cognitive Services first ensures image clarity, brightness, and region-of-interest validity. Once validated, vision models detect clinical markers in either throat photos or sputum photos. Each marker carries a calibrated weight that contributes to an overall Image Severity Score (S_i), where;

$$S_i = \sum(detected\_marker \times w_i)$$

and the result is normalized to a 0–1 range. Below are the **examples** that we use with Breathy

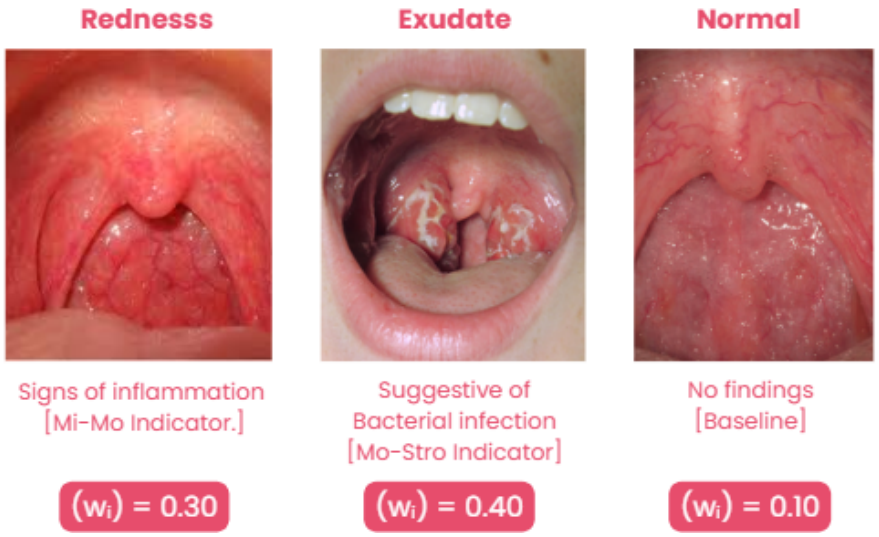


***Figure 14**. Throat Image and Corresponding Weight Example*

Marker	Description	Weight (w_i)	Severity
Greenish/yellow color	Indicates purulent infection (likely bacterial)	**0.40**	Strong indicator
Bloody streaks	Possible severe infection or complications	**0.30**	Moderate–strong indicator
Thick/viscous sputum	Suggests ongoing airway inflammation	**0.20**	Mild–moderate indicator
Clear/normal sputum	Minimal clinical concern	**0.10**	Low severity, baseline

***Figure 15**. Sputum Clolor and Corresponding Weight Example*

3.3.2 Symptom Inference

Text-based inputs are processed through Microsoft Copilot Studio with NLU and entity extraction. Responses are normalized into structured variables such as fever status, cough duration, shortness of breath, and comorbidity presence. Each extracted entity contributes a weighted score to a Symptom Severity Score (S□), where

$$S_s = \sum(present\_symptom \times w_s)$$

Below are the **examples.**

Symptom	Normalized Variable Example	Weight (w□)	Contribution to Severity
Fever ≥ 38°C	*fever_status = high*	**0.30**	Strong indicator
Cough > 3 days	*onset_days > 3*	**0.20**	Moderate indicator
Shortness of breath	*dyspnea = true*	**0.35**	Strong indicator
Comorbidities	*comorbidity = 1*	**0.15**	Mild–moderate indicator

***Figure 16**. Symptoms and Corresponding Weight Example*

3.3.3 Ensemble Triage

Breathy fuses results from both pathways to produce a unified Severity Score (S). The system assigns greater weight to image-based findings while still incorporating text signals, using the formula;

$$S = 0.6 \times S_i + 0.4 \times S_s$$

Which is then mapped into thresholds for classification:

Classification	Severity (S) Thresholds
Mild	S < 0.4
Moderate	0.4 ≤ S ≤ 0.7
Severe	.≥ 0.7

***Figure 17**. Patient's Condition Classification*

Please note that all formulas provided are intended solely for AI screening and triage support. The computed severity scores are designed to guide prioritization and workflow efficiency, but the **final clinical decision always rests with the verifying doctor.**

CHAPTER 4: PROTOTYPE

4.1 Patient's Whatsapp Breathy Bot

Patients can consult about what they are feeling, especially if they have the main symptoms mentioned, and have an abnormal phlegm color using Breathy's Whatsapp Bot!

***Figure 18**. Breathy's Whatsapp Chat Bot*

4.2 Patient's Website

Patients can also consult about what they are feeling using Breathy's Website Chat Bot! First, they have to sign in and login using their Whatsapp number to ensure connectivity and consistently between Breathy's Whatsapp Chatbot History Data and Breathy's Website Chat Bot History Data.

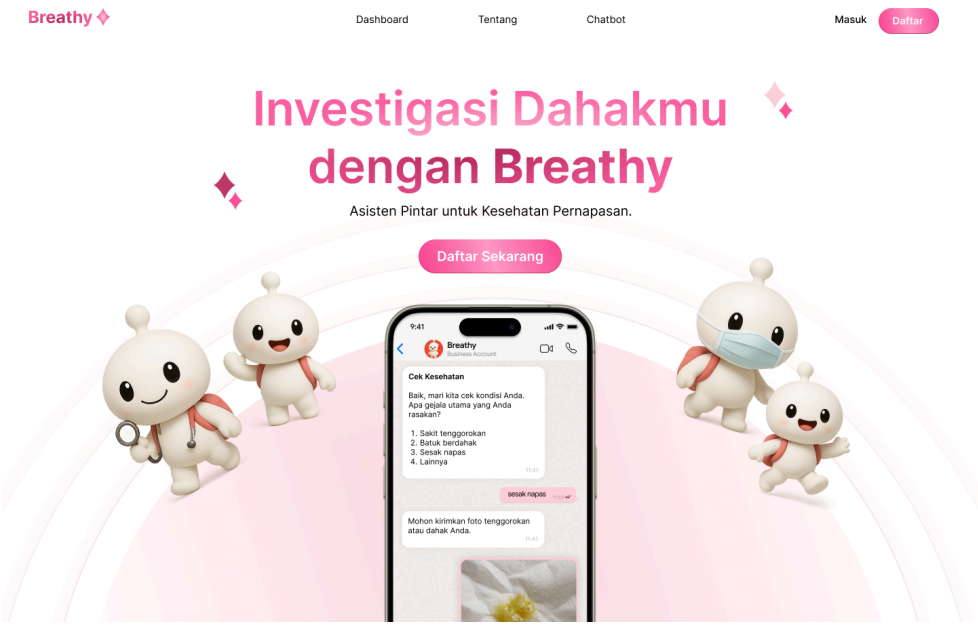


Figure 19. Breathy's Website Landing Page

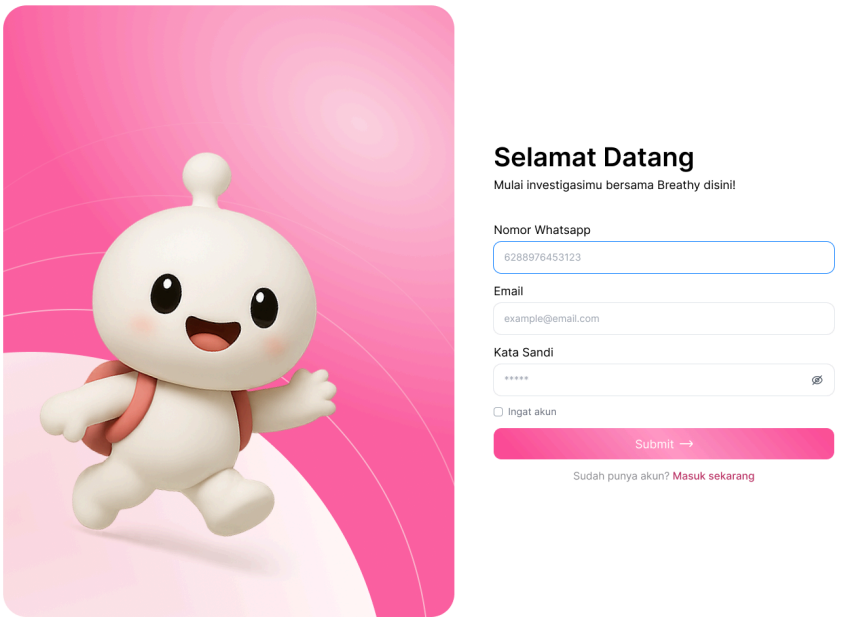


***Figure 20**. Breathy's RegisterPage*

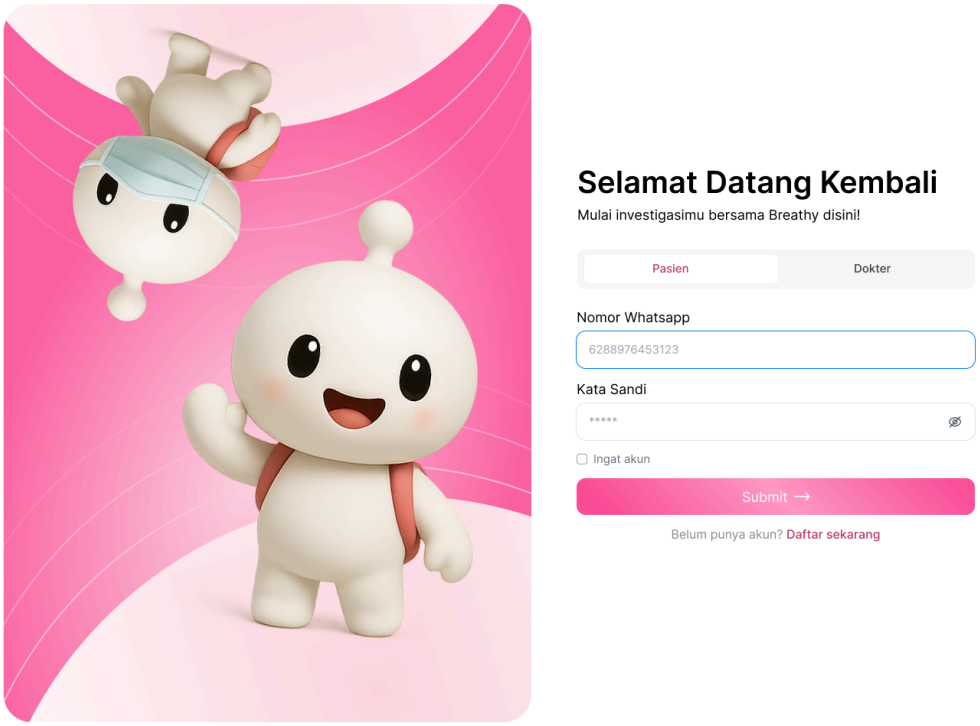


***Figure 21**. Breathy's Login Page*

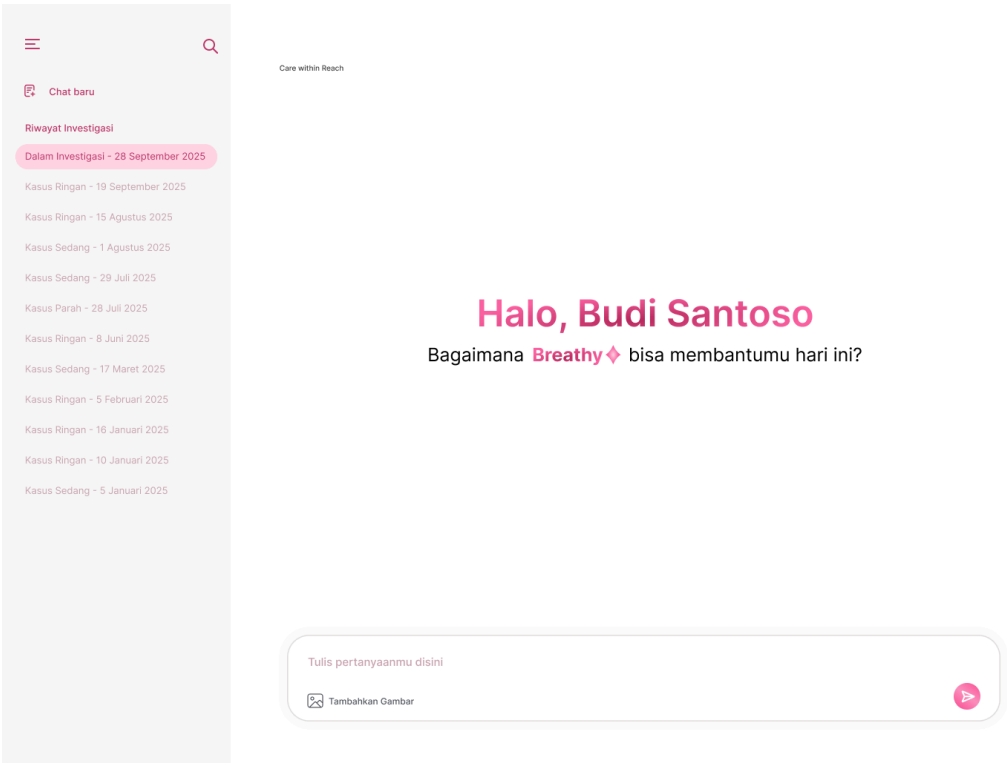


***Figure 22**. Breathy's Chat Bot Page*

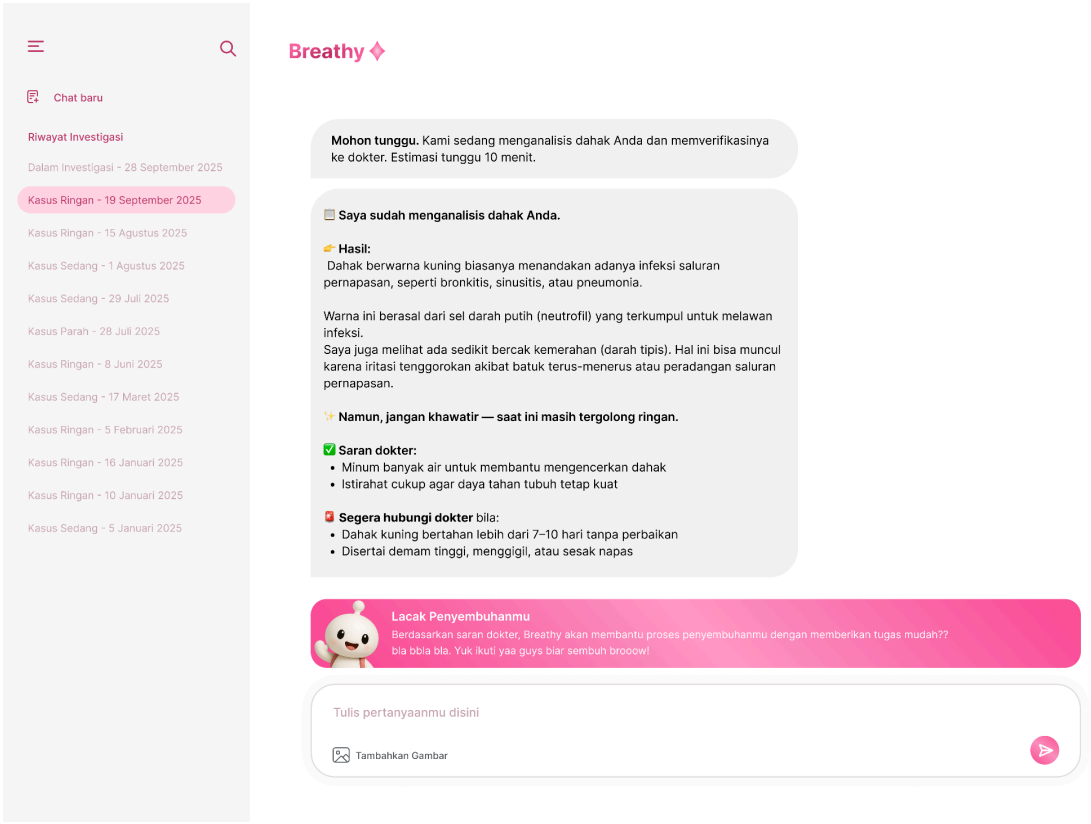


***Figure 23**. Breathy's Chat Bot Page(2)*

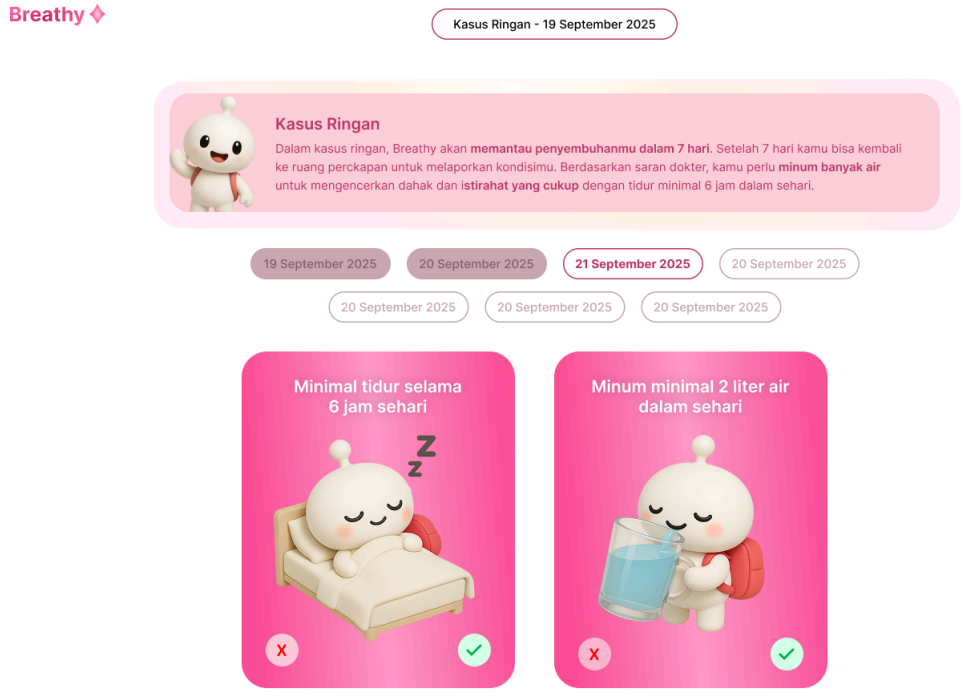


***Figure 24**. Breathy's Personalization Page*

4.2 Doctor's Dashboard

Doctors will monitor patients using Doctor's Dashboard where they receive several detailed information about the result of Breathy's AI Analysis. They can verify the results, or even clarify the diagnosis and send it to the user!

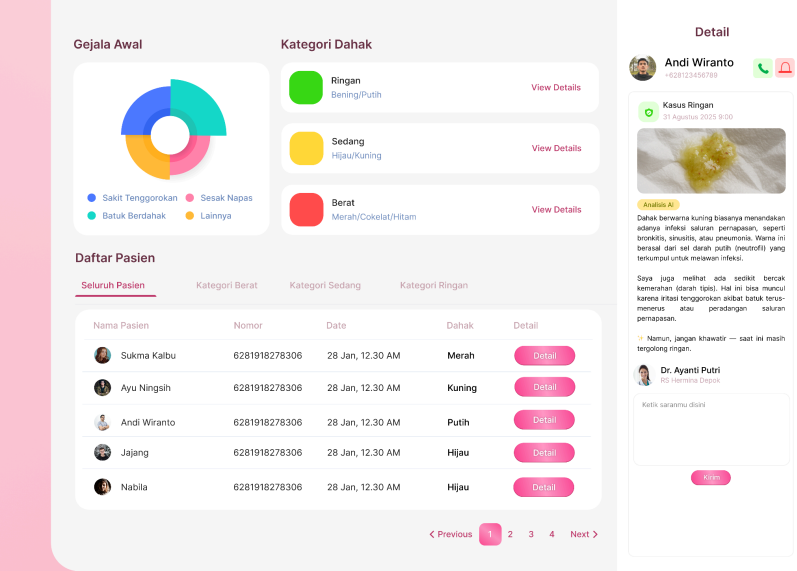


***Figure 25**. Doctor Dashboard*

4.3 Hospital's Dashboard

Hospitals can also see patient data and doctor's feedback. They can monitor how many urgent patients to prepare for the worst condition.

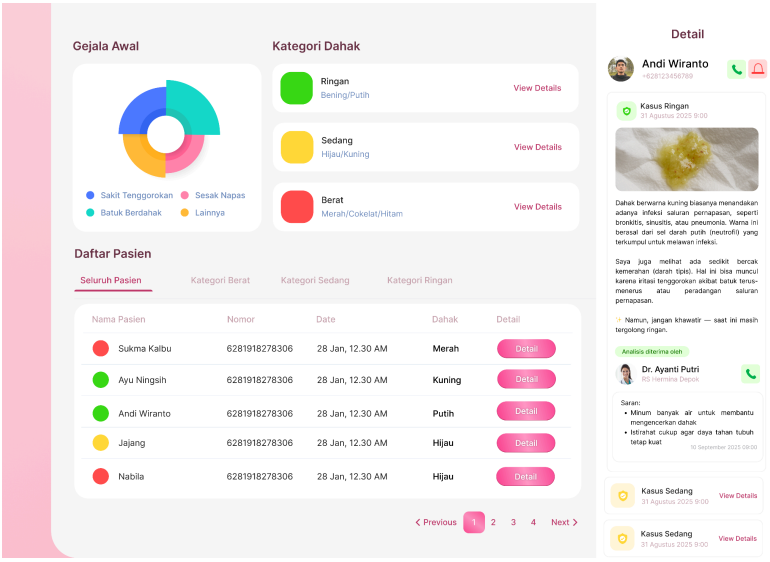


***Figure 25**. Hospital Dashboard*

CHAPTER 5: VALIDATION

We conducted a survey to validate both the technical feasibility of Breathy and the market readiness among potential users and healthcare stakeholders. The validation aimed to assess three key aspects:

1. Exploring user needs in relation to real ISPA conditions.
2. Exploring the solution approach to understand the readiness of society.
3. Exploring user feedback regarding Breathy as a digital health companion.

5.1 Exploring user needs in relation to real ISPA conditions

The survey results indicate that 83.3% of users reported frequently experiencing ISPA-related symptoms.

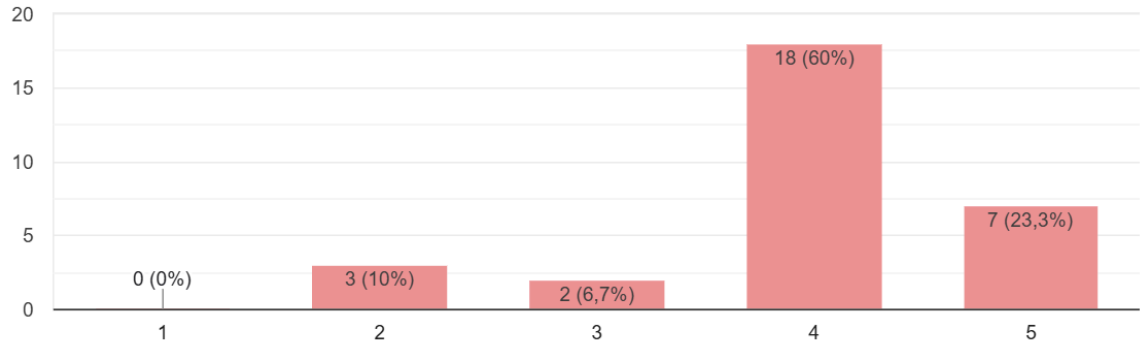


***Figure 26**. User's Frequent Exp*eriencing ISPA-related symptoms

They often use telemedicine and search online due to long queues, distant hospitals, and high costs. They also find it difficult to distinguish between mild and severe ISPA symptoms. 90% of them use self-medication and find existing telemedicine platforms insufficient for ISPA-related needs. User expect new innovation for rarely detection and clear guidance on initial ISPA symptoms. They also want a fast, accurate diagnosis and timely medical response, especially for communities in remote areas with limited access to healthcare facilities.

5.2 Exploring the solution approach to understand the readiness of society

We also assessed their readiness to use WhatsApp as our main product. About 60% expressed interest in accessing telemedicine through WhatsApp or the web. Most

respondents agreed that doctors should verify and take responsibility for the AI analysis results before the system delivers a final diagnosis. They also indicated that they are comfortable uploading throat or sputum photos to the system for AI analysis.

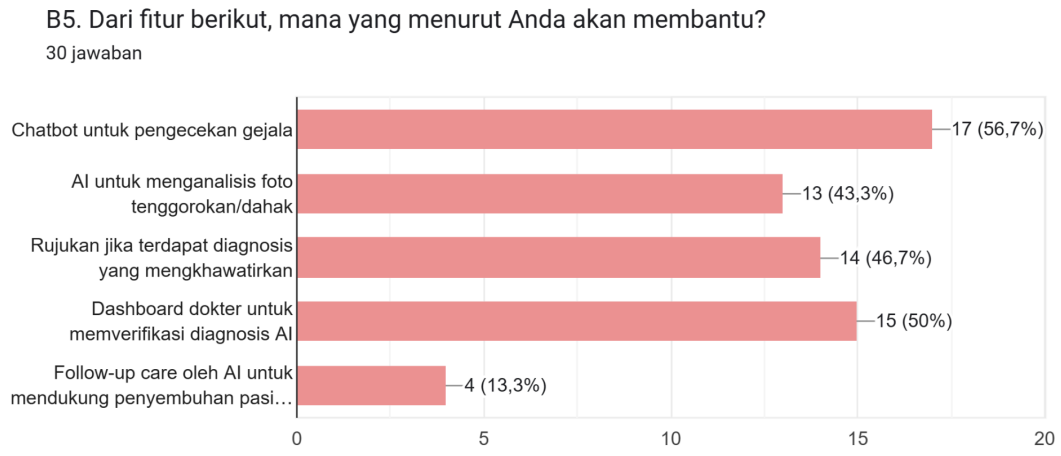


***Figure 27**. Chosen Breathy's Feature Data*

Most respondents found the chatbot for symptom checking (56.7%), doctor dashboard verification (50%), referral features (46.7%), and AI photo analysis (43.3%) as the most helpful. Meanwhile, follow-up care (13.3%) were seen as additional but less prioritized features.

Respondents expect the innovation to be trusted and useful by emphasizing the importance of data privacy and security, accurate and credible medical information, simplicity and accessibility for all user groups, and validation through collaboration with doctors and official health institutions, supported by clear socialization to the public.

5.3 Exploring user feedback regarding Breathy as a digital health companion

After presenting our prototype, all respondents expressed their willingness to try the final product. They felt that Breathy is easy to use, both for the general public and elderly users. A total of 93.3% of respondents believed that Breathy could effectively help address ISPA issues in 3T (remote, frontier, and underdeveloped) areas, and they stated that they would recommend it to their family or friends. Furthermore, all respondents reported feeling more reassured when using Breathy before deciding to consult a doctor, and they would be willing to adopt it if the cost is more affordable compared to existing

telemedicine services.

CHAPTER 6: BUSINESS POTENTIAL

4.1 Business Model Canvas (BMC)

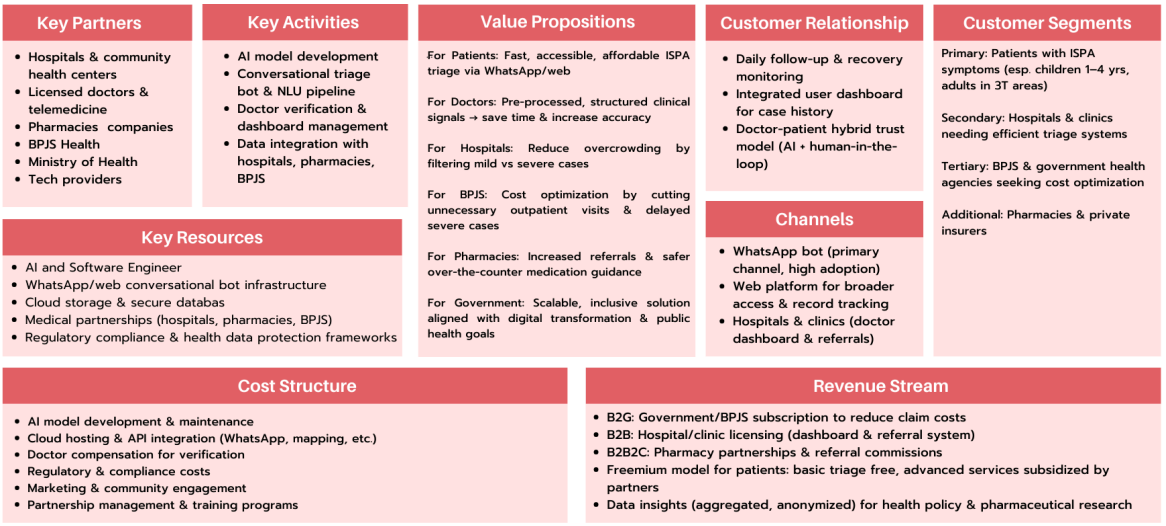


***Figure 28**. Business Model Canvas*

4.2 Timeline

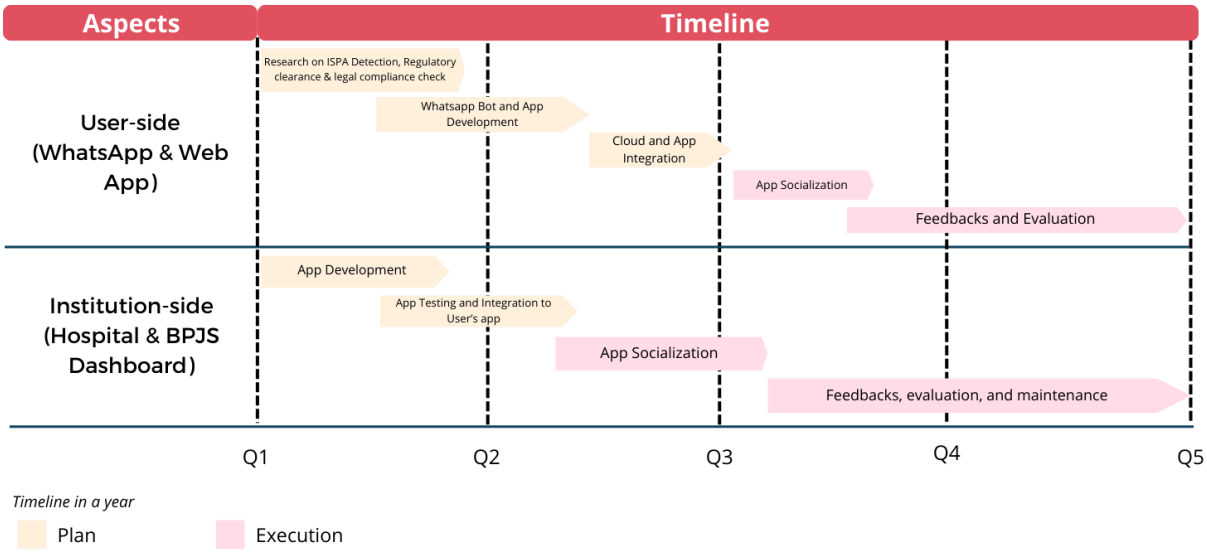


***Figure 29**. Timeline*

4.3 Risk Mitigation

Aspects	Potential Failure Modes	SEV	Potential Failure Effects	OCC	Potential Causes	RPN	Recommended Actions
Regulatory & Compliance Risk	Delay in approval for health data use & BPJS integration	9	App cannot launch or integrate with hospitals/BPJS	5	Complex bureaucracy, unclear regulations	64	Engage regulators from Q1, ensure PDN & HIPAA-like compliance, involve MoH early
Technology Risk	Misclassification of sputum/throat images	8	Wrong triage → delayed/severe cases untreated	6	Limited training data, poor image quality	30	Keep human-in-the-loop, expand dataset with hospital partners, add error-detection layer
Adoption Risk (Users)	Low uptake in rural areas	7	Limited impact, failed scaling	6	Low digital literacy, poor internet access	64	Prioritize WhatsApp-first (low friction), multilingual UX, local community outreach
Adoption Risk (Hospitals/BPJS)	Doctors reluctant to use dashboard	8	No institutional buy-in, wasted investment	5	High workload, resistance to change	56	Co-design with doctors, provide training, highlight efficiency gains, pilot incentives
Financial & Sustainability Risk	Insufficient revenue for scaling	7	Cannot expand beyond pilot	4	Overreliance on grants, lack of business model	48	Diversify revenue (BPJS contract, hospital subscription, pharmacy referral fees)
Security & Privacy Risk	Data breach / patient mistrust	10	Legal action, loss of trust, reputational damage	3	Weak encryption, mismanagement of sensitive data	49	Enforce end-to-end encryption, anonymize datasets, regular penetration testing
System Reliability	Server downtime during peak use	6	Interrupted service, loss of trust	4	Under-provisioned cloud infra, poor load balancing	24	Use scalable cloud infra, implement redundancy, 24/7 monitoring
Operational Scaling	Referral system fails in rural areas	6	Patients cannot access timely care	5	No pharmacy/hospital partners nearby	56	Map partners in advance, add fallback options (tele-consult, nearest available facility)

Figure 30. *Risk Mitigation*

CHAPTER 7: EXPANSION

6.1 Geographic Expansion

Breathy is designed to scale nationwide by leveraging existing digital infrastructure. The initial pilot will focus on high-prevalence provinces (e.g., Bali, East Java, South Sulawesi) and 3T areas where healthcare access remains limited. Expansion will follow a phased approach:

Year	Strategy
1	Coverage: 3–5 pilot districts in high-prevalence regions (Bali, East Java, South Sulawesi). User adoption: 5% of local ISPA cases (±50,000 users). Hospital & pharmacy integration: 10 partner facilities. KPI: >70% doctor adoption rate on dashboard during pilot.
2	
3	Coverage: 30% of provinces (±10 provinces). User adoption: 10–15% of national ISPA cases (±2.5–3.5 million users). Hospital & pharmacy integration: 150+ partner facilities. KPI: 20% reduction in non-urgent hospital visits in partner regions.
4	Coverage: >80% of provinces (nationwide rollout). User adoption: 30–40% of national ISPA cases (±8–10 million users). Hospital & pharmacy integration: 500+ facilities nationwide. KPI: ≥25% reduction in unnecessary BPJS claims for respiratory diseases.

***Figure 31**. Geography Expansion Strategy*

This strategy ensures scalability is aligned with epidemiological needs and health system readiness.

6.2 Expansion to Other Diseases

While Breathy focuses on Acute Respiratory Infections (ISPA) as the most urgent public health challenge, its core technology which are AI-based image analysis, conversational triage, and doctor verification, can be extended to other conditions. Potential future expansions include:

1. Tuberculosis (TB): leveraging sputum/throat analysis to support early screening.
2. Asthma and COPD: continuous monitoring of symptoms and exacerbation risks.
3. Dermatological Conditions: image-based triage of skin infections and rashes.
4. Non-Communicable Diseases (NCDs): structured triage for hypertension and diabetes in rural areas.

This modular approach allows Breathy to evolve into a comprehensive digital health ecosystem.

6.3 Monitoring and Predictive Analytics

Breathy will not only serve individual patients but also generate anonymized, aggregated health data. With appropriate privacy safeguards, this data can be used to:

- Real-time ISPA case mapping in >50% pilot districts by Year 2.
- Predictive outbreak alerts with >80% accuracy by Year 3.
- Policy support: Generate quarterly anonymized epidemiology reports for MoH & BPJS starting Year 2.

By transforming raw patient interactions into actionable epidemiological insights, Breathy positions itself as both a care platform and a national health intelligence tool.

CHAPTER 8: REGULATION

Scaling Breathy requires strict alignment with Indonesia's health and data protection regulations. The key areas are:

7.1 Health Regulations

- Ministry of Health (Kementerian Kesehatan): Breathy must comply with the Sistem Informasi Rumah Sakit (SIRS) and Sistem Informasi Rujukan Terintegrasi (SISRUTE) to ensure seamless hospital and referral integration.
- BPJS Health (JKN): Formal partnerships and approval are required to enable cost optimization through claim reduction.

7.2 Data Protection & Privacy

- UU Perlindungan Data Pribadi (PDP Act, 2022): Breathy must ensure patient consent, secure data storage, and restricted access.
- HIPAA-like safeguards: Encryption, anonymization of patient data for aggregated reporting, and audit logs for all clinical actions.
- Data residency: Patient health data must be stored within Indonesia, following government regulations.

7.3 Digital Health Certification

- Telemedicine compliance: Alignment with Permenkes No. 20/2019 regarding telemedicine services.
- AI in healthcare guidelines: Adhering to Ministry of Health pilot frameworks for AI-based diagnostic support (with human-in-the-loop requirements).
- Device/software registration: Potential certification with the Indonesian FDA (BPOM) for AI as a medical device if classification requires.

7.4 Risk Management and Ethics

- Ensure transparency of AI decisions with explainability (e.g., heatmaps on sputum images).
- Maintain doctor verification as mandatory to mitigate misclassification risks.
- Establish an ethics advisory board with representatives from MoH, BPJS, and medical associations.

CHAPTER 9: CONCLUSION

Breathy addresses one of Indonesia's most pressing public health challenges, Acute Respiratory Infections (ISPA), by combining accessible digital platforms with clinically validated AI support. Through WhatsApp and web-based services, Breathy empowers users to detect symptoms early, receive guided triage, and access doctor-verified recommendations, while hospitals and BPJS benefit from reduced strain on resources and improved efficiency.

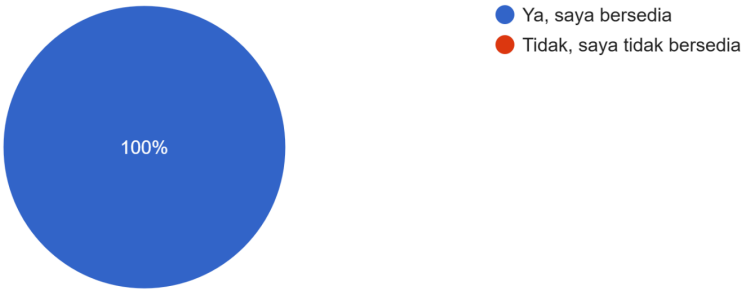
Survey validation shows strong readiness and trust among users, with over 90% willing to adopt Breathy if affordable and safe. The platform is designed with scalability in mind: starting from high-prevalence provinces and expanding nationwide, while ensuring compliance with health regulations and data protection laws.

Ultimately, Breathy is more than a telemedicine tool. It is an inclusive digital health companion that transforms ISPA care into a pathway of prevention, early detection, and efficient treatment. By bridging gaps between patients, doctors, and healthcare systems, In one year, Breathy has the potential to not only reduce ISPA burden but also evolve into a national health intelligence platform supporting broader disease management and public health resilience.

APPENDIX [VALIDATION FORM]

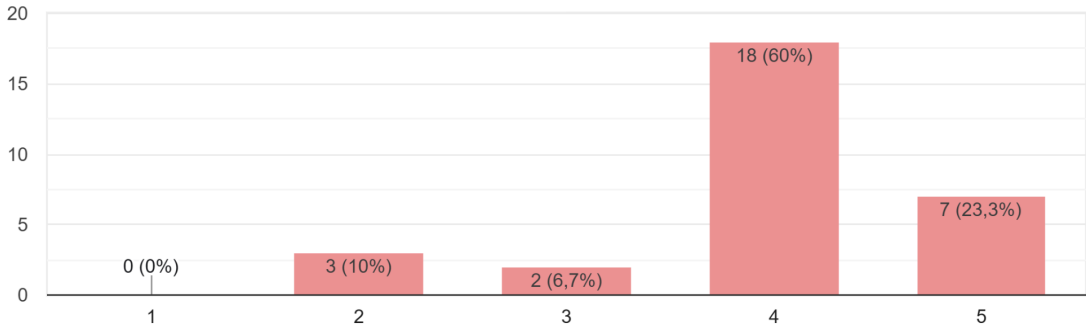
Saya telah membaca dan memahami penjelasan di atas terkait dengan kuesioner ini bersedia untuk menjadi partisipan

30 jawaban



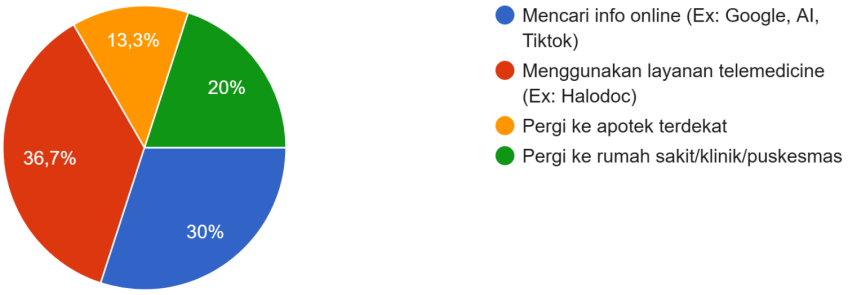
A1. Seberapa sering Anda atau keluarga mengalami gejala ISPA (batuk, pilek, sesak, sakit tenggorokan) dalam 6 bulan terakhir?

30 jawaban



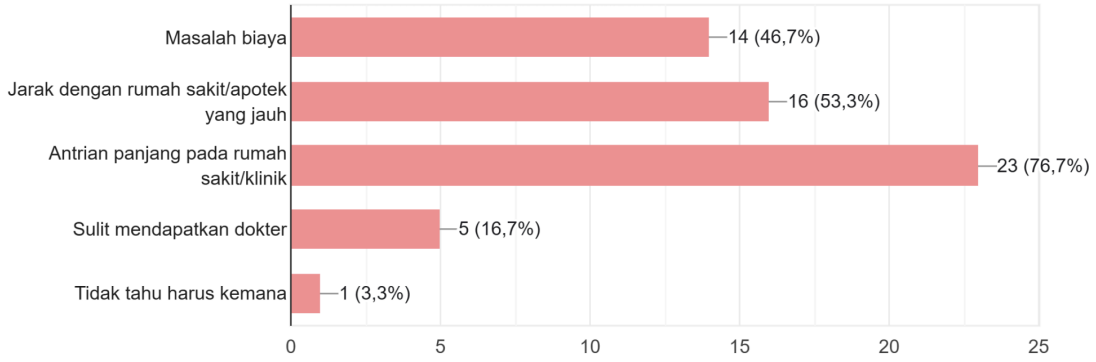
A2. Saat mengalami gejala ISPA, apa yang biasanya Anda lakukan terlebih dahulu?

30 jawaban



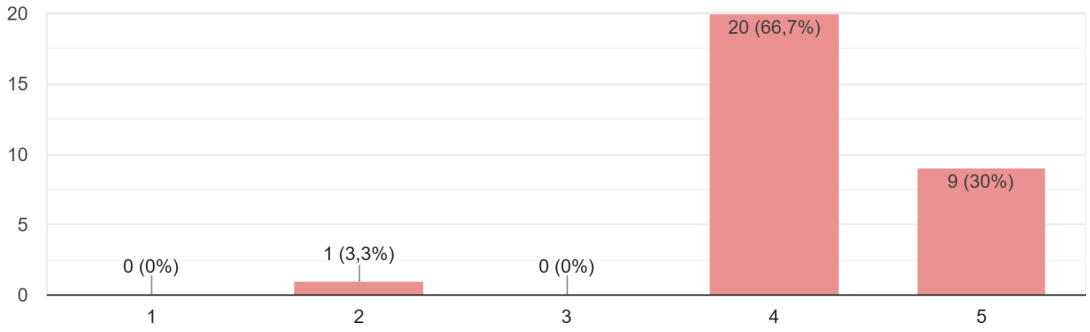
A3. Apa tantangan terbesar yang Anda rasakan saat mencari layanan kesehatan untuk ISPA? [Lebih dari 1]

30 jawaban



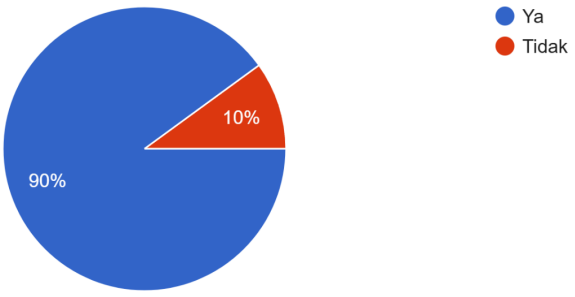
A4. Seberapa sulit menurut Anda untuk membedakan gejala ISPA ringan vs serius

30 jawaban



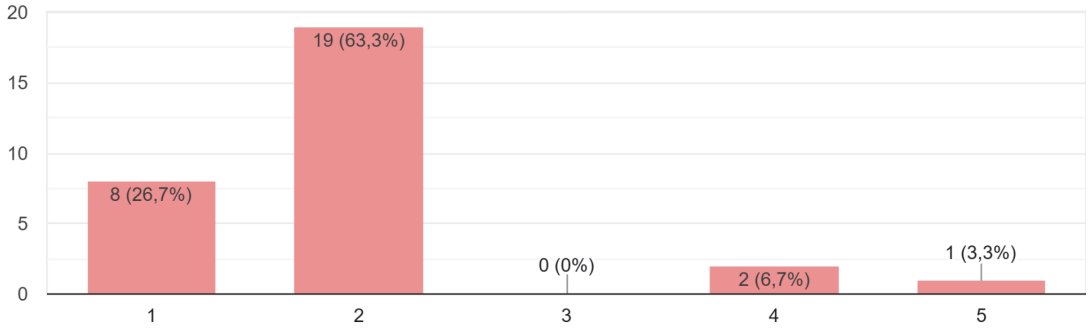
A5. Pernahkah Anda melakukan pengobatan sendiri (self-medication) untuk ISPA?

30 jawaban



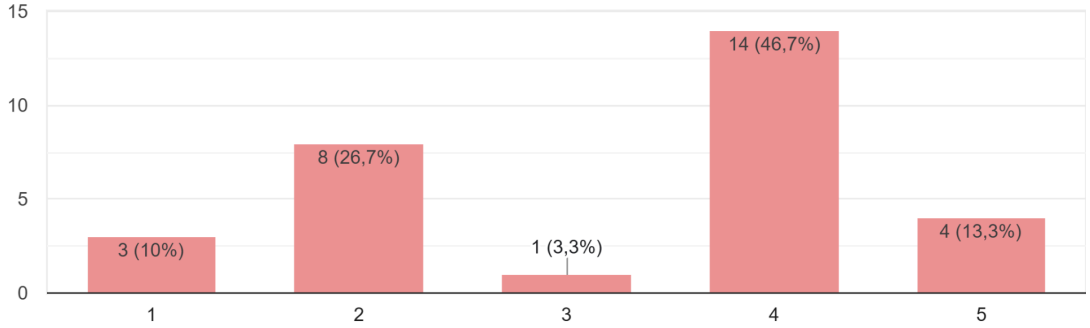
A6. Menurut Anda, apakah layanan kesehatan online yang ada sekarang sudah cukup membantu untuk ISPA?

30 jawaban



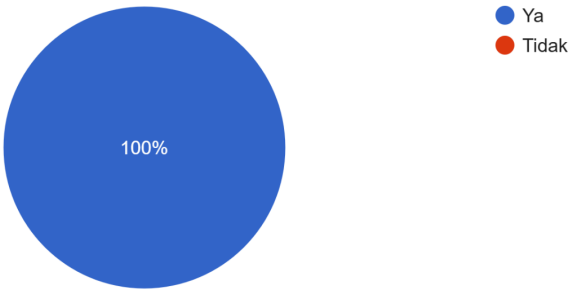
B1. Menurut Anda, seberapa menarik layanan kesehatan berbasis WhatsApp/web untuk deteksi ISPA?

30 jawaban



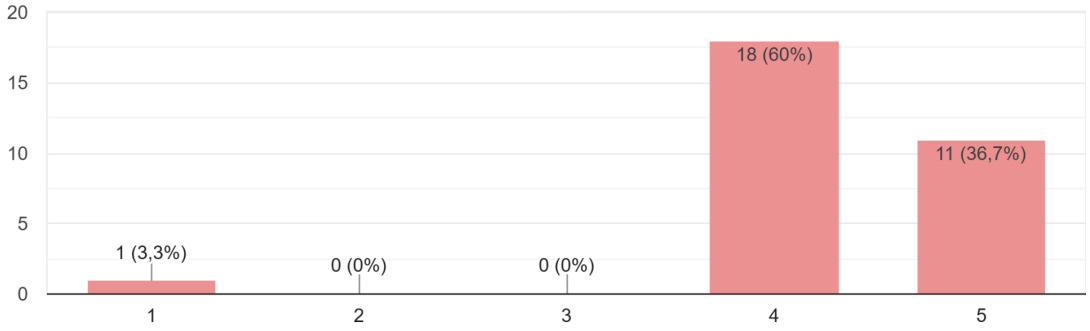
B2. Jika ada solusi baru pada fase diagnosa yang menanyakan gejala Anda langkah demi langkah, apakah Anda bersedia mencobanya?

30 jawaban



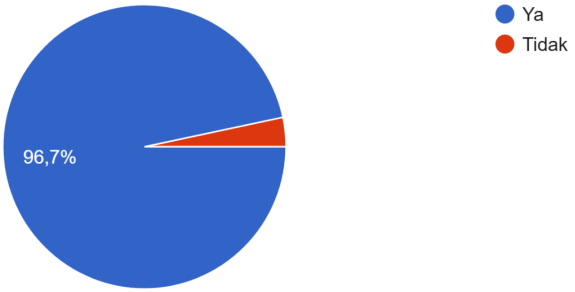
B3. Seberapa penting peran dokter yang memverifikasi hasil analisis AI sebelum memberi diagnosis akhir dan saran?

30 jawaban



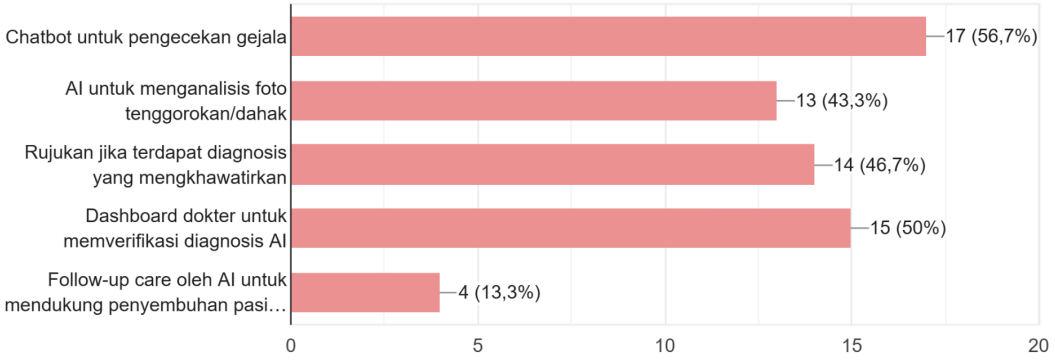
B4. Apakah Anda merasa nyaman mengirim foto tenggorokan/dahak ke sistem untuk analisis AI?

30 jawaban



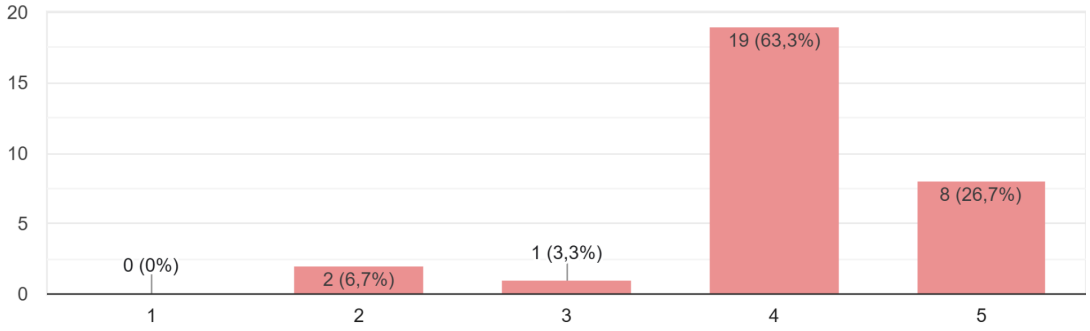
B5. Dari fitur berikut, mana yang menurut Anda akan membantu?

30 jawaban



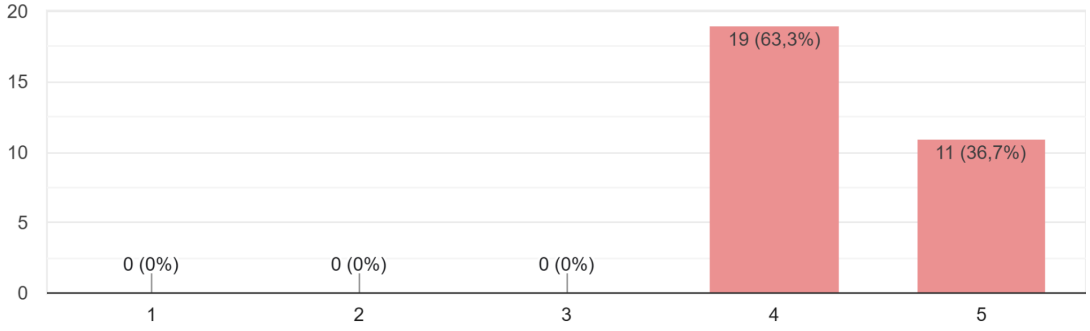
B6. Jika solusi baru ini bisa mengurangi kunjungan tidak perlu ke RS, seberapa besar manfaat yang Anda rasakan?

30 jawaban



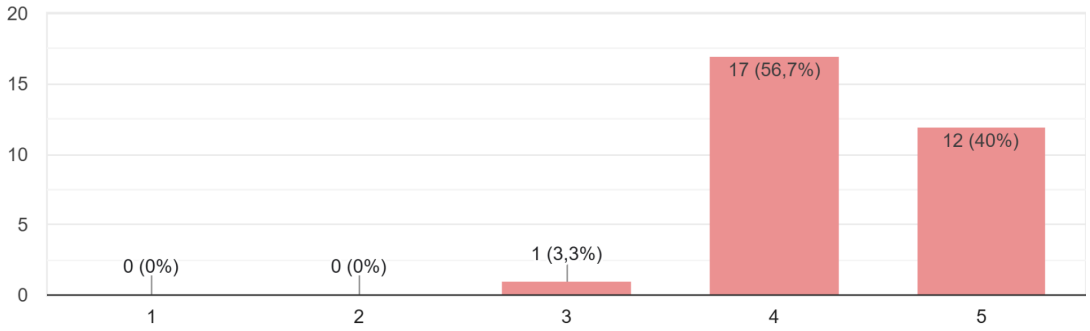
C1. Setelah mengenal konsep Breathy, seberapa besar kemungkinan Anda mencobanya jika tersedia?

30 jawaban



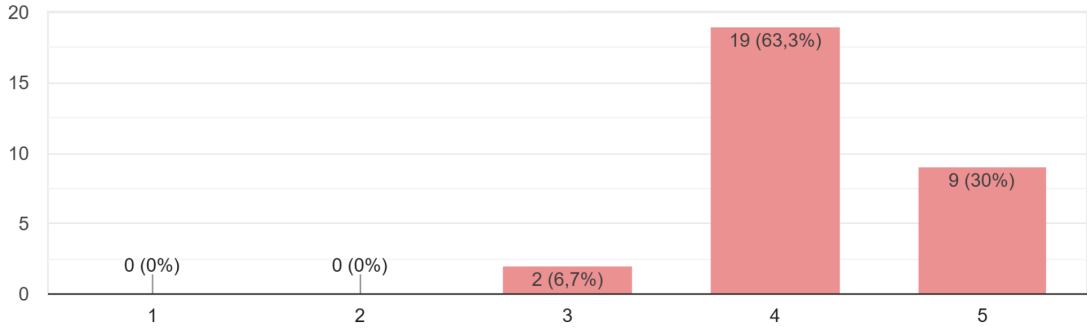
C2. Menurut Anda, seberapa mudah Breathy digunakan oleh orang tua atau masyarakat awam?

30 jawaban



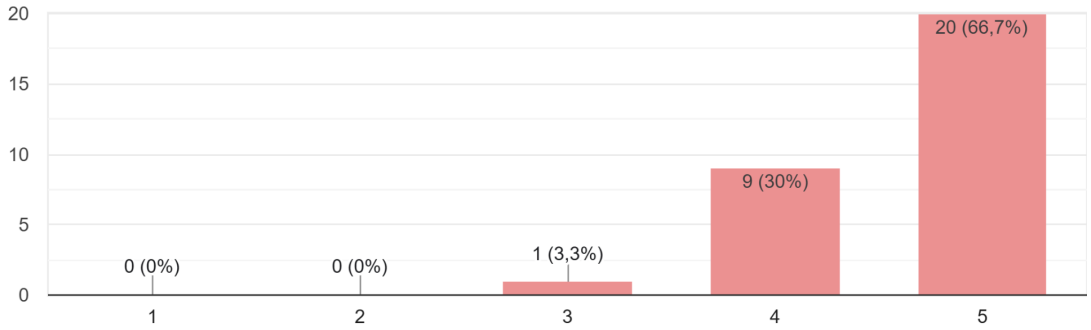
C3. Seberapa yakin anda akan kemampuan Breathy untuk menangani permasalahan ISPA pada daerah 3T?

30 jawaban



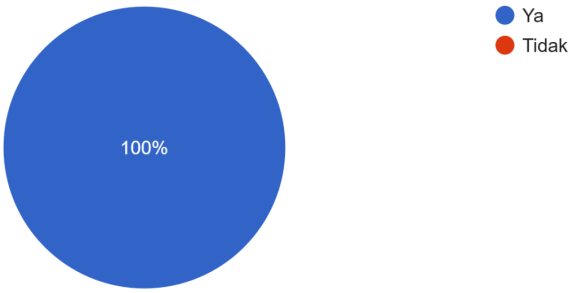
C4. Seberapa besar kemungkinan Anda merekomendasikan Breathy ke keluarga/teman?

30 jawaban



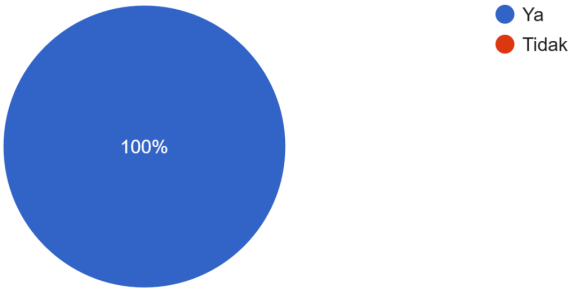
C5. Apakah Anda akan merasa lebih tenang menggunakan Breathy sebelum memutuskan ke dokter/RS?

30 jawaban



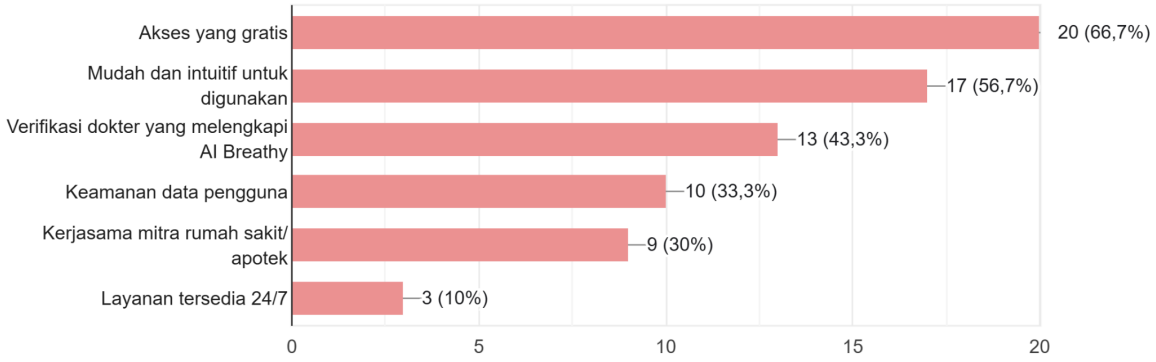
C6. Apakah Anda bersedia menggunakan Breathy jika biayanya lebih murah dibanding telemedicine biasa?

30 jawaban



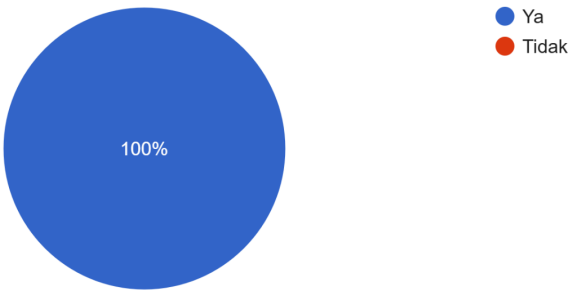
C7. Menurut Anda, faktor apa yang paling penting agar Breathy bisa sukses?

30 jawaban



C8. Jika Breathy bisa membantu mendeteksi gejala lebih cepat, apakah Anda akan merasa lebih percaya diri dalam mengambil tindakan medis?

30 jawaban



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