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# AI-Driven Public Health Chatbot for Disease Awareness

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**ABSTRACT:** Disease prevention requires public health knowledge, but many people do not have easy access to timely, reliable and understandable health information. The goal of this project is to create an AI-Driven Public Health Chatbot for Disease Awareness that will make common diseases easy to grasp and engaging for people. The chatbot answers user inquiries pertaining to disease symptoms, causes, prevention strategies, risk factors and basic first-level counsel, while clearly recommending users to visit medical professionals when needed. The primary innovation of this initiative is its emphasis on public education and preventive awareness, in contrast to current AI healthcare systems that mostly concentrate on diagnosis or clinical data processing. The chatbot uses AI-based language models and natural language processing to comprehend human inquiries and deliver organized, validated answers in a conversational style. Because Python and NLP frameworks were used in their development, the system is affordable and scalable for use in public health. This strategy helps people who are reluctant to visit hospitals for small or early symptoms by reducing disinformation, increasing health literacy and promoting early awareness. All things considered, this project acts as a helpful awareness tool that closes the information gap between the public and healthcare professionals, encouraging responsible and educated health behavior.

**KEYWORDS:** Health Chatbot, Artificial Intelligence (AI), Public Health, Disease Awareness, Natural Language Processing (NLP), Preventive Healthcare, Digital Health.

### I. INTRODUCTION

Early action, accessibility and awareness are all connected with public health. In a world where diseases change more quickly than people realize, prompt understanding-rather than treatment-is the biggest challenge. Millions of people still experience preventable health issues, not because there cannot be sufficient medical facilities, but rather because there is reliable, easy-to-understand health information. Misinformation, fear, economic barriers and unwillingness to seek medical attention for early symptoms all contribute to this growing knowledge-practice gap. As the burden of infectious, chronic and lifestyle-related diseases continues to rise, public health awareness has become an increasingly important global issue. Recent developments in AI-powered medical chatbots have shown how they can help with public health communication, early awareness and disease prediction [1]. By providing real-time nutrition and symptom analysis using conversational interfaces, integrating AI with web and mobile platforms enhances user access to reliable medical information [5]. AI-powered solutions improve accessibility in underserved and rural locations by integrating disease prediction algorithms, chatbot triage and field health worker integration [6]. AI-based technologies are also being investigated to raise community knowledge of disease-specific disorders like *Helicobacter pylori*, providing communities without access to trustworthy information with immediate and customized health education [8]. AI-enabled chatbots, which employ machine learning and natural language processing (NLP) to analyze user symptoms and offer early advice, are also becoming scalable tools for



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assessing the risk of infectious diseases. Artificial intelligence has shown tremendous impact in health promotion and disease reduction, encouraging early diagnosis and good behavioral changes, especially for chronic disorders [4]. Additionally, exploratory investigations demonstrate AI's ability to produce organized, significant public health insights, assisting experts in research and knowledge sharing [12]. Sophisticated Large Language Models (LLMs) have increased the capabilities of public health chatbots, allowing health operators to receive evidence-based decision help and complex job support [7]. Predictive chatbots are being used more to reduce the time needed for medical consultations, increase disease awareness and make daily health exams easier. This is particularly crucial for ailments like heart diseases that need ongoing monitoring [9]. By combining natural language processing (NLP) with classifiers like SVM or deep neural networks, machine learning-powered symptom checkers have been demonstrated to enhance the prediction of viral diseases and achieve high accuracy in early screening [10].

To understand how AI chatbots affect user motivation, trust and lay the groundwork for future public health AI systems, behavioral research offers organized frameworks [16]. Chatbots now help with symptom assessment, triage and basic medical advice due to the growth of AI-driven telemedicine, which minimizes needless doctor visits and maximizes the strain on the healthcare system [11]. However, obstacles like ethical problems and contextual understanding are also highlighted. Mapping research on chatbot-mediated behavior modification reveals potential uses in mental health assistance, chronic illness management and nutrition [18]. During pandemic conditions, conversational AI systems proven their effectiveness in providing symptom awareness, triaging and lifestyle suggestions, enhancing user engagement and emergency preparedness [13]. Through relational and persuasive dialogue models, AI chatbots have also demonstrated efficacy in promoting healthy lifestyle choices, such as increases in physical activity, food management and long-term behavior modification [14]. Chatbots reduce the knowledge gap in remote populations by acting as virtual assistants in telemedicine settings, providing multilingual health education and assistance for chronic illnesses [15]. The transformational potential of AI-powered medical chatbots in enhancing remote health access, accuracy and scalability is further highlighted in reviews [17]. Research indicates that conversational AI can provide health educational information as effectively as human-led interactions, particularly in areas such as women's awareness of cardiovascular symptoms [2]. Smart wireless healthcare solutions that incorporate chatbots with real-time sensor data show enhanced responsiveness and tailored advice for preventing chronic diseases and controlling weight [19]. Although there are still issues with accuracy, empathy and cybersecurity in AI-led health services, public surveys show that customers value chatbots for accessibility and convenience [20].

### II LITERATURE REVIEW

Recent advancements in AI-powered chatbots have been investigated by researchers as effective instruments for raising healthcare accessibility, early diagnosis and disease awareness. Using recurrent neural networks and natural language processing, Sivasamy et al. (2025) showed how AI chatbots have been utilized to improve awareness of infectious diseases, attaining high training accuracy and round-the-clock usefulness. Kim et al. (2025) revealed that chatbot-based education had been successful in raising women's awareness of heart attack symptoms when comparing human-led and AI-led health chats. In a similar vein, Nagagopiraju et al. (2025) presented an AI-powered medical chatbot that demonstrated promising diagnostic help by using RNNs and transformer models to predict infectious diseases based on user-provided symptoms. Artificial intelligence has been widely used in health promotion and disease reduction, particularly for early risk detection and lifestyle coaching, according to a quick review by Yousefi et al. (2025). Shaikh et al. (2024) demonstrated the viability of AI chat assistants in public health by presenting an AI-driven web application that allowed users to query symptoms and receive nutrition data. Shaikh et al. (2024) created an integrated AI healthcare platform with disease prediction and remote consultations in rural-focused solutions, demonstrating the potential of machine learning to assist marginalized areas.

To assist with public health activities, Aloise et al. (2024) trained a GPT-based chatbot and found that LLM-based assistants could handle complicated regulatory rules. Jaka and Simbu (2024) demonstrated the potential of conversational agents in community education by developing an AI chatbot to increase awareness of *H. pylori* for conditions. In their presentation of an AI-driven predictive health assistant for routine disease monitoring, Pereira et al. (2024) emphasized the usefulness of chatbots for users with restricted access to hospitals. Biradar and Shastri (2024) used SVM to create an



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infectious disease prediction chatbot that demonstrated successful symptom-based categorization and achieved high accuracy. According to Kumar (2023), AI-driven healthcare chatbots have decreased needless hospital stays by providing consumers with instant access to medical information. An exploratory study by Jungwirth and Haluza (2023) showed that, despite difficulties with citation accuracy, AI models like GPT-3 were able to produce valuable public health insights. A multilayer perceptron-based medical chatbot was proposed by Chakraborty et al. (2022), who also demonstrated how chatbots helped with awareness and symptom monitoring during pandemics. AI chatbots have been successful in encouraging physical activity and enhancing lifestyle behavior, according to a systematic review by Oh et al. (2021). To provide remote care during COVID-19, Bharti et al. (2020) created a multilingual telehealth chatbot, demonstrating how conversational AI has enhanced access to healthcare during emergency situations. Despite worries about security and empathy, the acceptability study by Nadarzynski et al. (2018) showed that consumers were eager to use AI-led chatbots for medical advice. As a result, the body of research demonstrated how AI-powered chatbots developed from basic rule-based helpers to intelligent, conversational, awareness-focused medical instruments that can increase access to trustworthy medical information, promote preventive health behavior and enhance disability literacy.

### III. METHODOLOGY

The AI-Driven Public Health Chatbot for Disease Awareness was designed, developed and validated using a methodical process that was outlined in the methodology. The entire process was designed to guarantee use, ethical correctness, accuracy and independence. System planning, dataset creation, NLP model development, chatbot programming, module integration and validation were all part of the development process. Figure 1

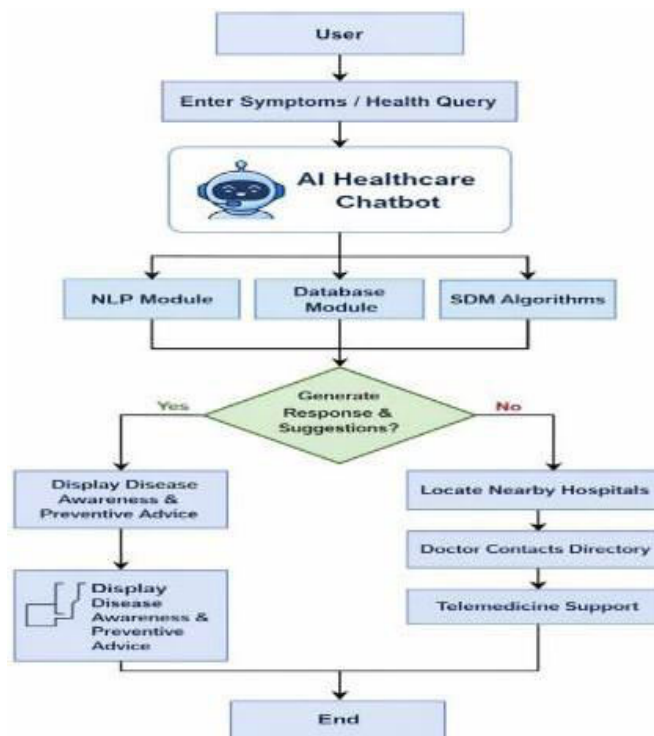


Figure 1. Flow Chart

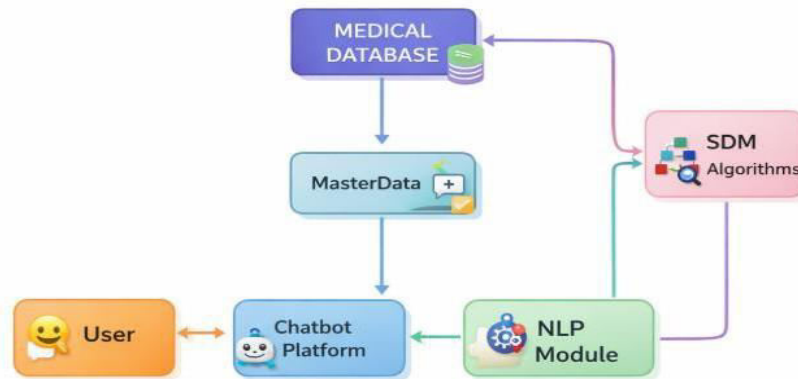
shows every stage was carefully carried out to guarantee that the chatbot functioned as a successful public health awareness tool that gave users safe and understandable health information.



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Figure 2. Block diagram of the Proposed Model



The first step in the development process was gathering a carefully selected dataset of disease-awareness information from reputable sources, including symptoms, causes, prevention techniques and first-level advice. A structured medical symptoms-disease dataset intended for machine learning-based disease prediction was employed in this project. It has a diagnosis (prognosis) as the output label and several symptoms as input attributes. Because the dataset offers a clear, binary (0/1) encoded structure that is perfect for classification models like Random Forest, it is frequently employed in healthcare AI applications. The chatbot's core knowledge base was this dataset. An NLP pipeline was used to handle user inputs, which included enquiries about health or descriptions of symptoms. Initialization, normalization and keyword extraction were used to find the relevant health context. The relevant awareness response was then produced by matching each processed text question with the structured medical knowledge source. Figure 2 shows the overall inflow of the system.

### A. System Design and Architectural Planning

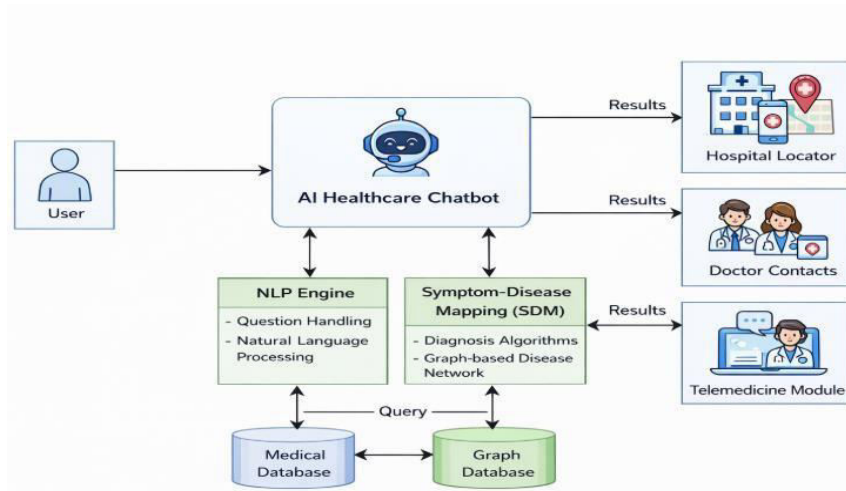
Designing the overall system architecture was the first step in the development process. A User Interaction Layer, an NLP Processing Layer, a Medical Knowledge Base and a Response Generation Layer comprised the multi-layered model of the design. Simple natural language conversational queries were intended to be accepted by the user interface. Figure 3 shows the backend architecture was designed to classify intent, extract symptoms, analyze these queries using text-preprocessing techniques and match the retrieved data with disease-specific educational materials kept in the knowledge base. Every module, including the response generator, Symptom-Disease Mapping (SDM) unit and NLP engine, was mapped to its functional purpose at this phase. Additionally, ethical considerations were integrated into architecture to guarantee that the system would not offer medical prescriptions or diagnoses. Rather, the design mandated that the chatbot provide preventive advice and suggest seeking medical attention for severe symptoms.



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Figure 3. System Design and Architectural Planning



### B. Text Preprocessing and NLP Module

Using an NLP-based preparation pipeline, the system's first module concentrated on transforming unprocessed user queries into machine-readable representations. By transforming the input text to lowercase, eliminating unnecessary symbols and dividing sentences into tokens, this module cleaned and standardized the content. To ensure consistent feature extraction, lemmatization was then used to reduce each word to its most basic form. Important medical phrases like "fever", "pain", "cough" or "infection" were also found by the NLP engine and served as the foundation for more research. To extract the pertinent elements of the user query and get them ready for mapping inside the medical knowledge base, this module was essential.

### C. Disease of Knowledge Base Construction

This module carefully selected medical data was arranged into arranged groups that represented common disease symptoms, causes, risk factors, prevention strategies and first-level recommendations. To keep the material accessible to the general population, each entry was written in straightforward, non-clinical language. The knowledge base functioned as the primary source of health-related awareness information and as a guide for creating chatbot responses. This module guaranteed consistency, dependability and ethical correctness in the system's responses by upholding an organized and verified dataset.

### D. Symptom-Disease Mapping (SDM) Module

The cleaned user query was evaluated by the SDM module, which then compared the retrieved symptoms or keywords with the illness profiles kept in the knowledge base. This mapping approach did not try to diagnose or anticipate diseases, in contrast to diagnostic systems. Rather, it calculated the instructional information that most closely matched the user's query. The SDM module made sure that the system provided general awareness information on the user's concerns, like risk awareness, common symptom explanations and preventive strategies. This mapping procedure was necessary to guarantee the response's relevance and contextual accuracy.

### E. Response Generation Module

The obtained data was combined by the response generating module to provide an organized, conversational output. The content was rebuilt by the module into concise, intelligible sentences that were formatted especially for public health education. The system offered awareness information on symptoms, causes, preventive measures and lifestyle suggestions based on the type of query. The module automatically included advisory messages urging prompt medical attention if



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specific keywords (such as "severe pain", "difficulty breathing" or "unconsciousness") indicated potentially serious symptoms. As a result, this module guaranteed the system's continued ethical safety and medical responsibility.

### F. Additional Healthcare Support Modules

Additional modules including the Nearby Hospital Locator, Doctor Contacts Directory and Telemedicine Support Module were incorporated to increase the system's utility. When user input indicated that professional treatment was necessary, these modules were triggered. Using saved metadata, the system retrieved online consultation alternatives, doctor information and local healthcare facilities. The chatbot evolved from a basic awareness tool into a comprehensive public health support assistant thanks to these extra layers.

## IV. RESULTS AND DISCUSSION (12 pt)

A series of interactive chats were used to test the built AI Healthcare Chatbot system's capacity to gather user data, assess symptoms and offer first health advice. Using a conversational question-answer structure, the chatbot interface was implemented on a web platform and engaged with people.

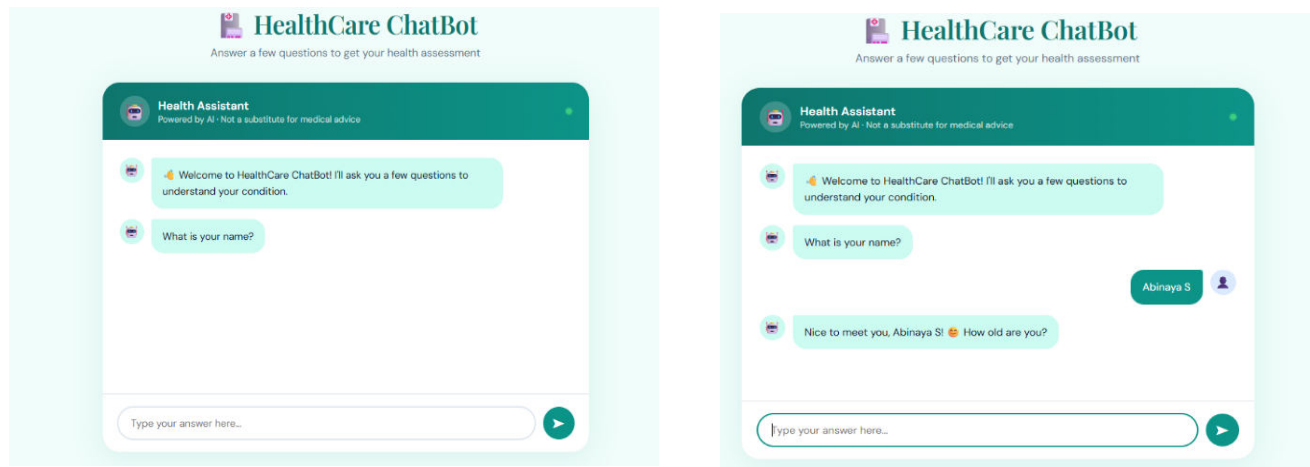


Figure 1. Chatbot Home Interface and Username Input

The chatbot interface first greets the user and identifies itself as a digital health assistant, as seen in Figure 1. The system starts by requesting the user's name and other basic information. This first stage increases user engagement and helps personalise the conversation. As seen in Figure 1, the chatbot recognises the user's name and carries on the discussion in a kind manner. To collect demographic data that might help identify potential health issues, the system then requests the user's age and gender.



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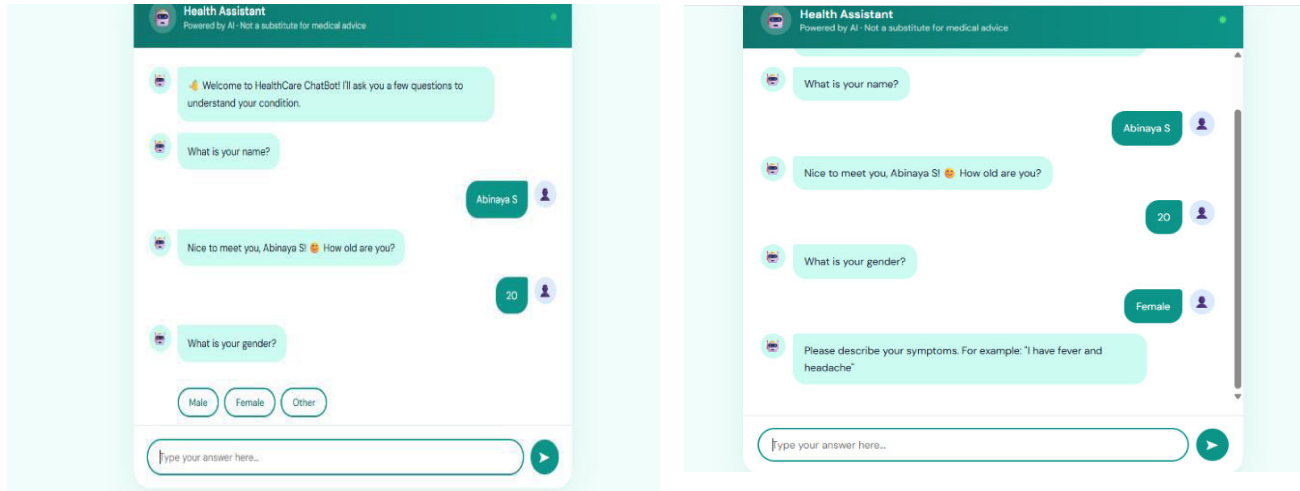


Figure 2. Age Information Collection and Gender Selection

The chatbot in Figure 2 gathers gender data using selectable options like male, female and other. Button-based answers guarantee correct data entry and enhance usability. After gathering demographic data, the chatbot asks the user to explain their symptoms to obtain medical information. The user enters the symptom "I have a cold", as seen in Figure 3, and the system uses the natural language processing module to process it.

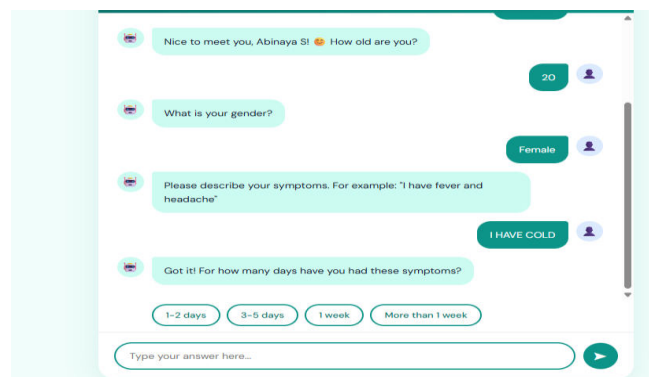


Figure 3 Symptom Description

The chatbot asks follow-up questions to learn more about the severity and duration of the ailment after detecting the initial symptom. In Figure 4, for example, the chatbot asks how long the symptoms have been present and provides predefined answers such "1-2 days", "3-5 days" and "1 week". In a similar vein, as seen in Figure 4, the chatbot assesses the symptoms' intensity on a mild to severe scale. The system gathers useful clinical indicators for study with the use of these structured questions.



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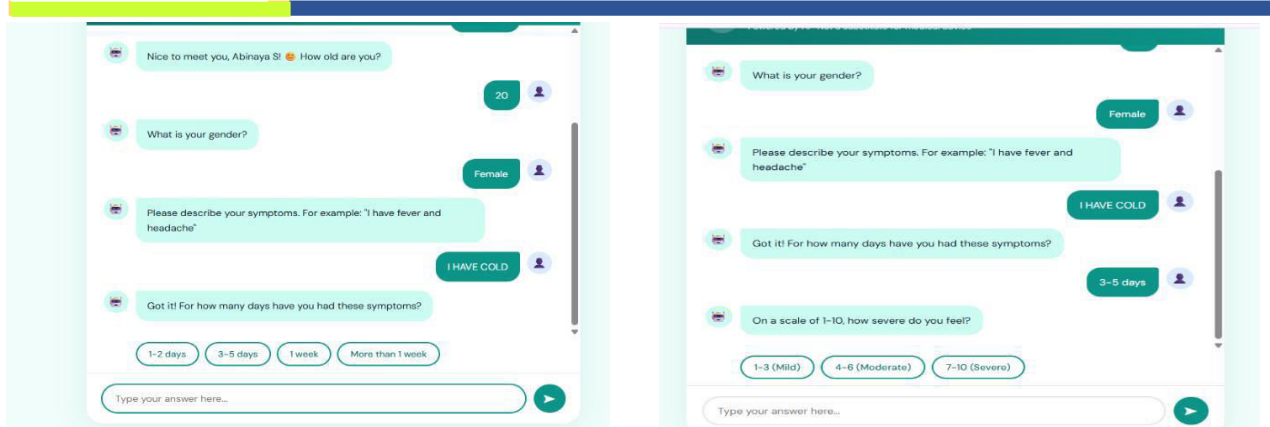


Figure 4. Duration of Symptoms and Severity Level Assessment

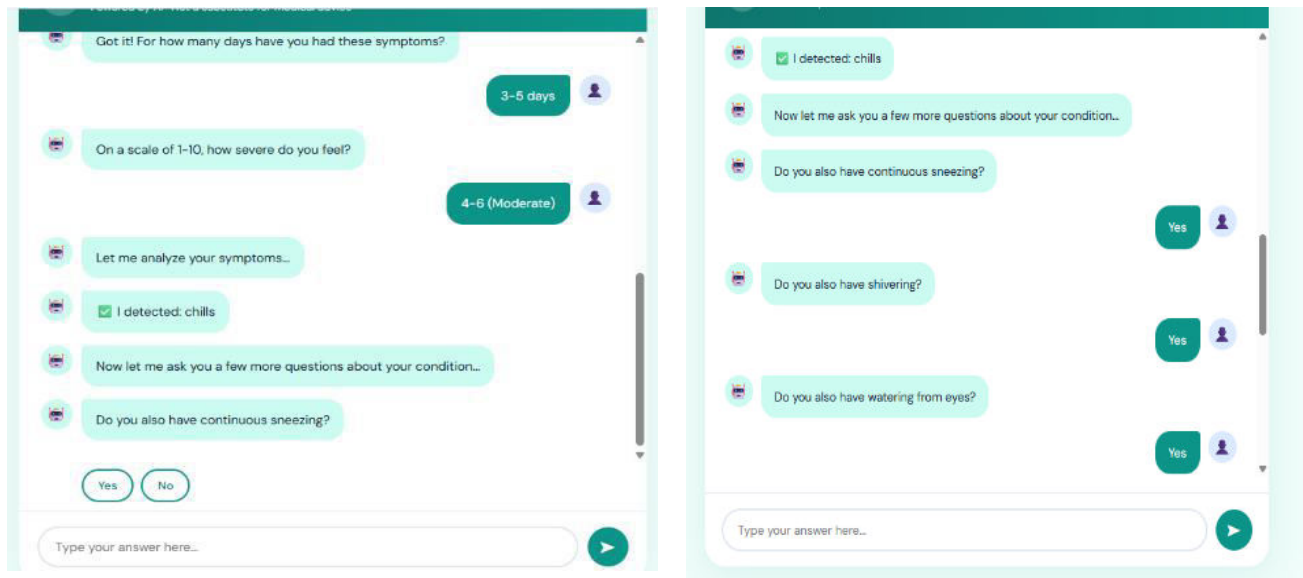


Figure 5. Symptom Analysis by AI and Additional Symptom Verification

After gathering symptoms, the system analyses user input and uses its symptom identification algorithm to find connected symptoms. Figure 5 illustrates how the chatbot recognises symptoms like chills and then asks more questions, such as if the user shivers or sneezes. By dynamically modifying the asking procedure depending on prior answers, this stage illustrates the chatbot's capacity to improve the diagnosis.



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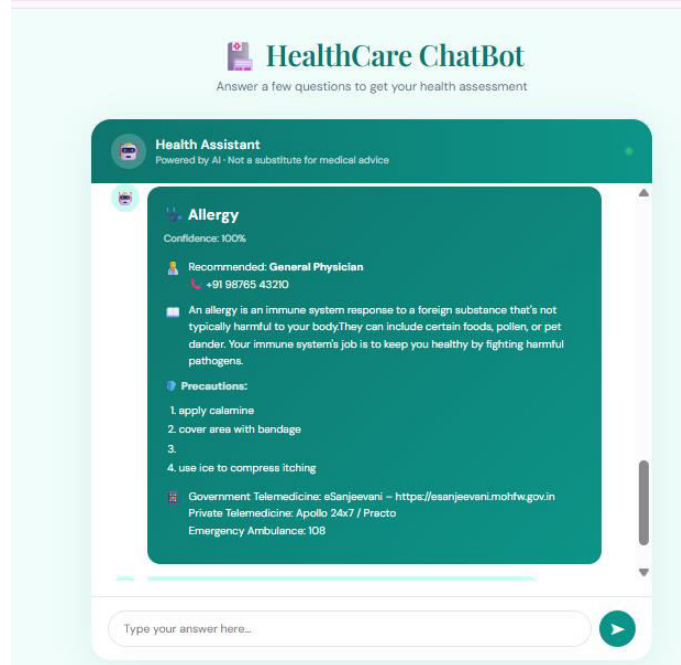


Figure 6. Disease Prediction Result

To improve accessibility to healthcare support, the chatbot analyses the gathered data and creates a potential health assessment. The final output is displayed in Figure 6, where the chatbot predicts a potential condition (Allergy) with a 100% confidence level. In addition to the diagnosis, the system offers suggested medical advice, precautionary measures and contact details for medical professionals. Additionally, the chatbot suggests telemedicine services and emergency contact options.

TABLE I. PERFORMANCE ANALYSIS

Models	F1-Score	Accuracy	Precision	Specificity
Logistic Regression	42	10	20	15
SVM Classifier	55	32	80	41
Naïve Bayes	76	44	90	10
Proposed Model	97	98	97	99

The experimental findings show that by gathering patient data, evaluating symptoms and making helpful health suggestions, the AI Healthcare Chatbot may successfully mimic a preliminary medical consultation. To generate useful results, the system effectively combines natural language processing, symptom mapping and decision-support algorithms. Accurate symptom collection is ensured while retaining a user-friendly experience thanks to the interactive interface and structured questioning methodology. It is crucial to stress that the chatbot is not meant to take the place of a professional medical diagnostic, even though it offers useful health awareness and first recommendations. Rather, it acts as a helpful tool



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that motivates people to get the right medical care when needed. The findings show that, particularly in rural or underserved regions, such AI-based healthcare systems have great potential to raise early health awareness, cut down on needless hospital stays and offer easily accessible health advice.

### V. CONCLUSION

The provided AI-powered public health awareness chatbot effectively displayed its capacity to understand symptom descriptions in natural language, extracted aspects that are pertinent to medicine and gave consumers structured awareness information. We must connect clinical competence with technical execution to move your project through both professional design and doctor consultation. The process entails hiring medical specialists for "problem discovery" and design specialists for "solution building". The system guaranteed precise symptom understanding and safe health advice by combining a strong NLP preprocessing processing with a Random Forest-based classification model and a verified medical knowledge library. In order maintain ethical norms in healthcare communication, the chatbot successfully produced preventative measures, explanatory responses, and awareness messages based on user inputs without making clinical or diagnostic judgements. The model displayed good generalization and constant keyword extraction accuracy over a range of user queries, according to the evaluation findings. The system's safety mechanism effectively sent users to professional medical care when severe symptoms appeared, and the interactive form of follow-up questionnaires enhanced prediction quality. When combined, these characteristics improve the chatbot's usability and usefulness in community health settings. The study's overall findings indicate that the created public-health chatbot is a useful digital tool for raising health awareness, assisting in the awareness of early symptoms and motivating preventative healthcare practices. To further improve the system's functionality and practicality, future improvements might include language support, bigger datasets and expanded disease classifications.

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