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Development of an Expert System for Doctor Diagnosis of HIV/AIDS

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ABSTRACT

An HIV/AIDS Diagnosis Expert System is developed to assist doctors in the diagnosis of HIV/AIDS disease in patients. In this development, advance reasoning, knowledge representation, rules methodology, and searching techniques in diagnosis of HIV/AIDS are considered as development tools. Also the phenomenon of knowledgebase query language, and inference engine including natural language called production rule are also used to arrive at an expert system that can assist doctors in the diagnosis of real life situation of Acquired Immune Deficiency Syndrome (AIDS) in any patients that is to be tested. From the results obtained using the system it is however proved a working tool that can assist the Doctor in quick diagnosis of an AIDS carrier. It thereby, saves valuable time and provides an ideal quick reference companion for HIV/AIDS diagnosis.

Keywords: Expert, System, Doctors, Diagnosis, HIV/AIDS & Carriers..

Aims Research Journal Reference Format:
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1. BACKGROUND TO THE STUDY

The use of computer technology in all aspects, revolutionized the industry, with the recent development of Artificial Intelligence (AI), vision system, natural language, and Expert systems are increasing the impact of CAD\CAM with benefits to individual and society[1]. In medicine, computerized database, networks, and knowledgebase system help doctors and hospital personnel to save lives. The field of Expert systems belongs to the fifth-generation technology dedicated to narrowly specialized professions. They are prototype of fifth-generation computer dedicated to problem solving in highly specialized areas such as branches of medicine and the likes. They are knowledgebase system, which make use of inference engine, natural language, as well as knowledgebase query language.[2]

Acquired Immunodeficiency Syndrome (AIDS)

The term Acquired Immunodeficiency Syndrome (AIDS) is used to describe the late stage of HIV disease, this is a chronic progressive process that begins when HIV enters the blood stream of the affected person it progresses over a period of over ten years, as the virus replicates in lymphoid tissues, relentlessly destroying the host immune system.[10] During this time the host is often becomes increasingly susceptible to and eventually dies from complications of opportunistic infections and malignancies resulting from immune dysfunction[3].

Nevertheless, the study intended to develop system that helps doctors to diagnose HIV\AIDS. A complete Expert System that will fully reflects the knowledge of the doctor in the field of HIV\AIDS for medical diagnosis where correct information can be literally a matter of life and death with emphasizes and interpretation most frequently required for "on the spot" patient evaluation i.e. patient overall health status.[3]

2. METHODOLOGY

Procedure for Diagnosis and Therapy

When a patient reports at hospital for appointment, the patient will produce his/her card to the medical records personnel who will fetch the patient's case note or file and ask the patient to join the queue of others patients waiting to see the doctor for treatment. The doctor will go through the existing records in the patient file note and proceeds to interview the patient, asking the patient several questions with view to confirm the reliability of the patient conditions.

From their discussions to the symptoms, medical tests, reaction of the patient to certain drug(s), side effect of the drug and possible additive tendencies can be detected.[5] The doctor will then compare symptoms against the disease that are known to cause such reactions by using his/her experience or by consulting a medical book. Once the disease(s) is diagnosis, the doctor will prescribe drugs to be used and recommends the drug doses on the file/case note. Figure 1.0 shows Flow Chart of the whole expert system and its basic components.

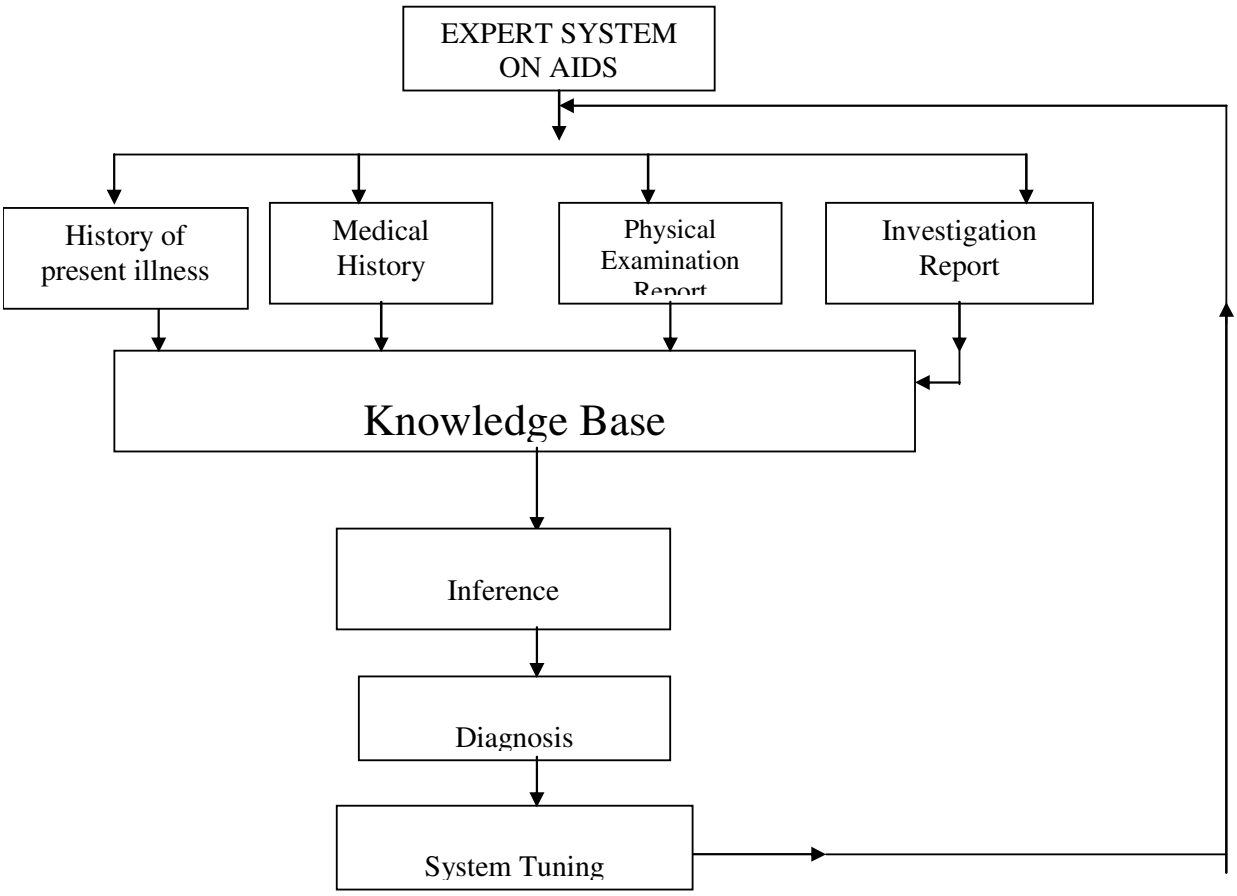

Figure 1.0 : low Chart of the whole expert system and its basic components.

3. RESULTS AND DISCUSSION

The expert system for the diagnosis of AIDS patient is developed by implementation of the algorithms of diagnosis following the procedure shown in the flowchart in fig 1.0 .The procedure was then developed as an expert system by the use of Visual Basic programming language. From the system the modules explained below are the various forms in the system.

Bio-data - module displays Bio-data form and allows user to registers' and updates and delete the bio-data information of registered patient. Bio-data table - module that interact with database, adds new patient to bio-data table, retrieves edicts, and delete the records of a registered patient.

Diagnosis HIV/AID – module that allows the entry of different types of symptoms, signs into the diagnosis catalogues.[2]

The main interface of the software is Multitude Document Interface that allows user to operate the program submenu and it functions. Starting the program, it will asks for users password , if the user password is valid, splash screen

automatically follows and stays while expert diagnosis initialize the Main Menu Screen – fig 1.1appears else error message.

The main menu contains (i) Patient Bio-data file for new & Old Records (ii) Diagnosis file for inference and HIV patient Reports.

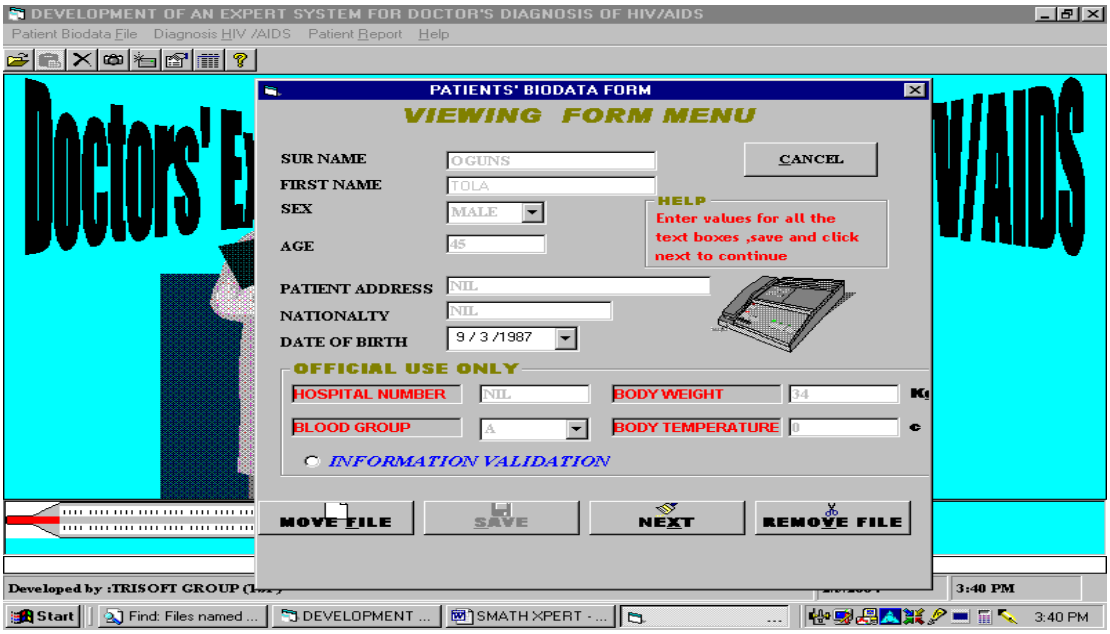

Figure 1.1 – MAIN MENU

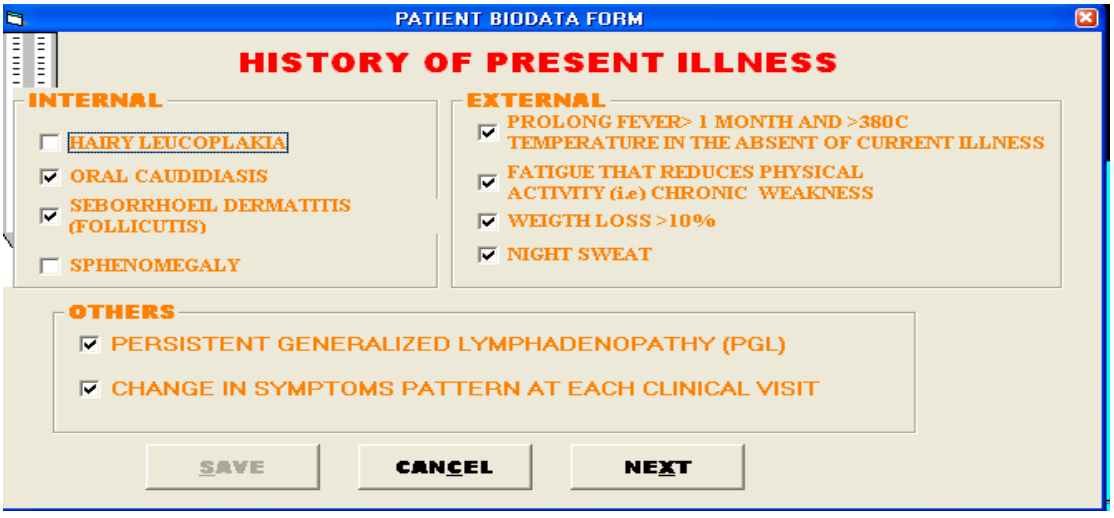

Figure 2.0-History of Present Illness

Figure 2.0 and 3.0 shows the shot screens of the form for the History Of The Present Illness and the Patients Medical History these actually capture the detail information about the patients' sickness and different related medical problems and operations he has undergone in the past.

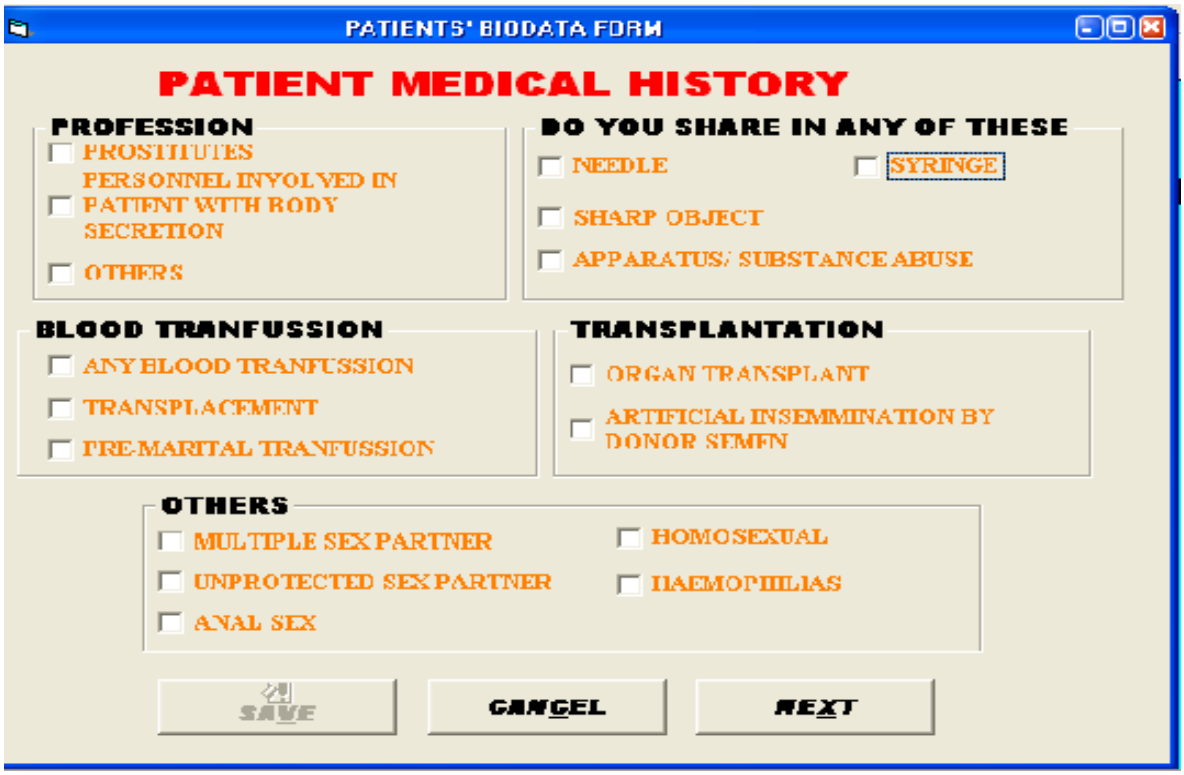

Figure 3.0 Patient Medical History

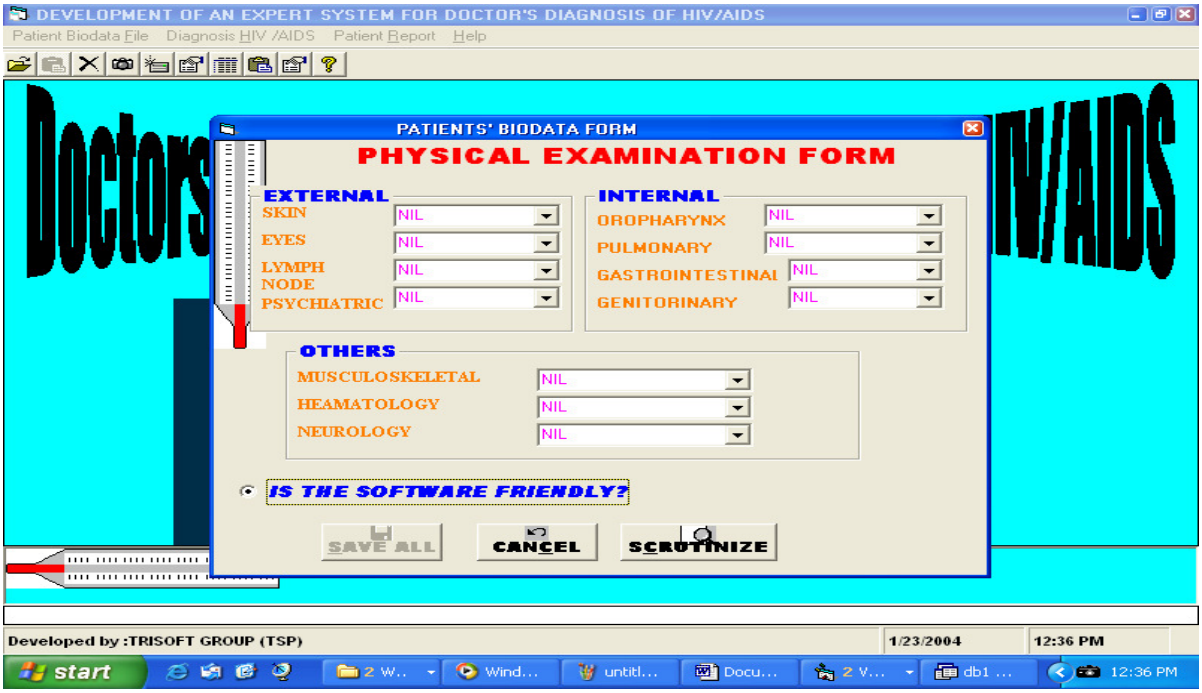

Figure 4.0 Physical Examination Form

The next form is fig 4.0 - Physical Examination Form where details information of physical examination of the patients by the doctor are stored .You can save /cancel/ scrutinize. If you click, scrutinize. The system gives the preliminary diagnosis (without laboratory investigation) i.e., either "AIDS IS/ NOT SUSPECTED....." ask whether you want to proceed. (Note that you should not proceed if the patient is yet to go for laboratory test).[6]

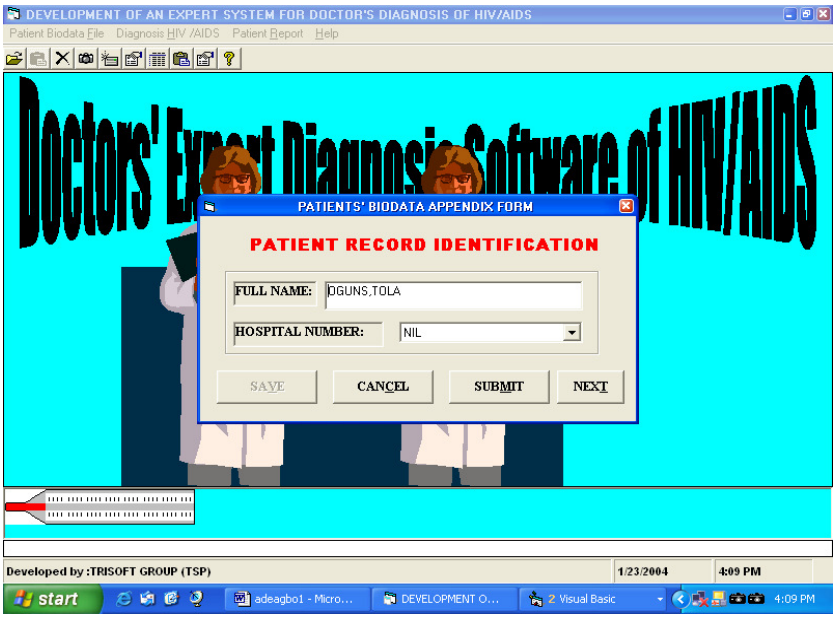

Figure 5.0 Patients Record Identification

If yes/ok is selected, Patient Record identification screen appears, Fig 5.0- Patient Record Identification, select "Submit" for the system to proceed to Fig 6.0 - HIV Diagnosis inference Engine where the validated laboratory test result is classified

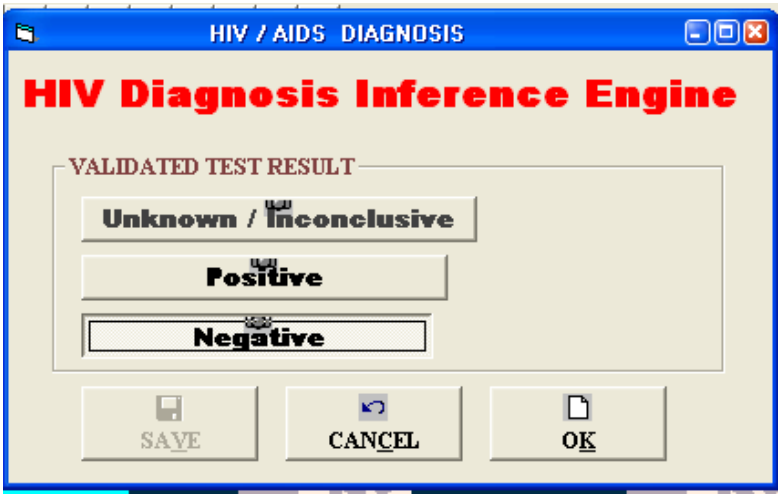

Figure 6.0 HIV Diagnosis Inference Engine

Select any of the validate result and click ok button, various other forms follows depending on the validated result i.e. fig 7.0 – 13.0

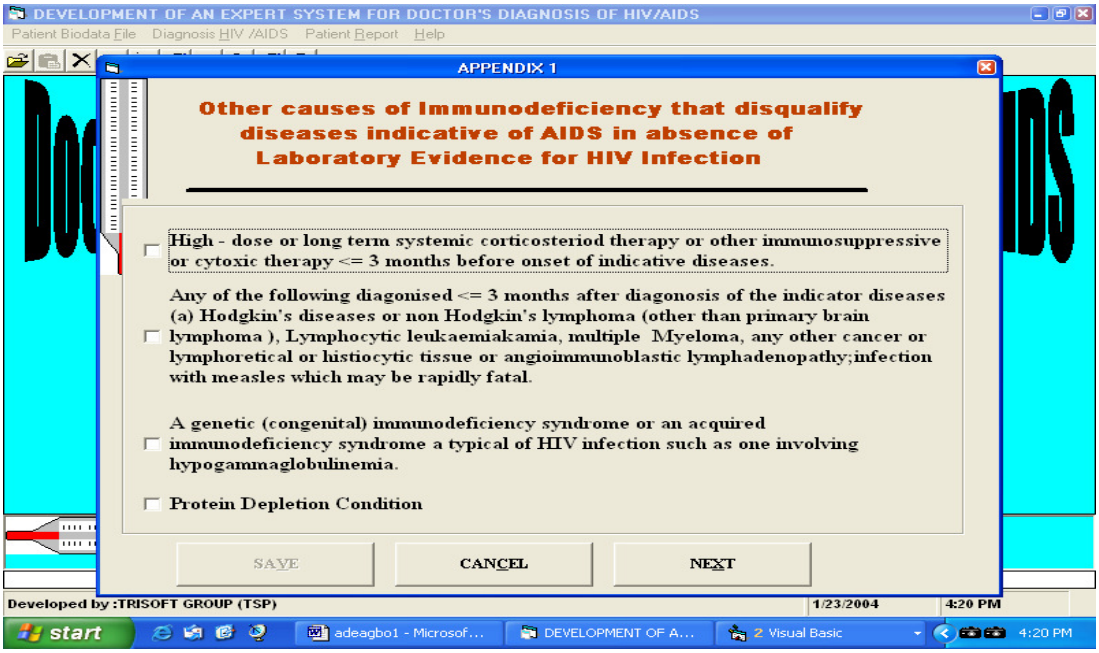

Figure 7.0 Other Causes of AIDS diagnosed

Figure 7.0 displays other causes of immunodeficiency that disqualifies diseases indicative of aids in absence of Laboratory evidence for HIV infection.[7] Whereas Figures 8.0 and 9.0 show the form that indicates the diseases indicative of AIDS definitely diagnosed.

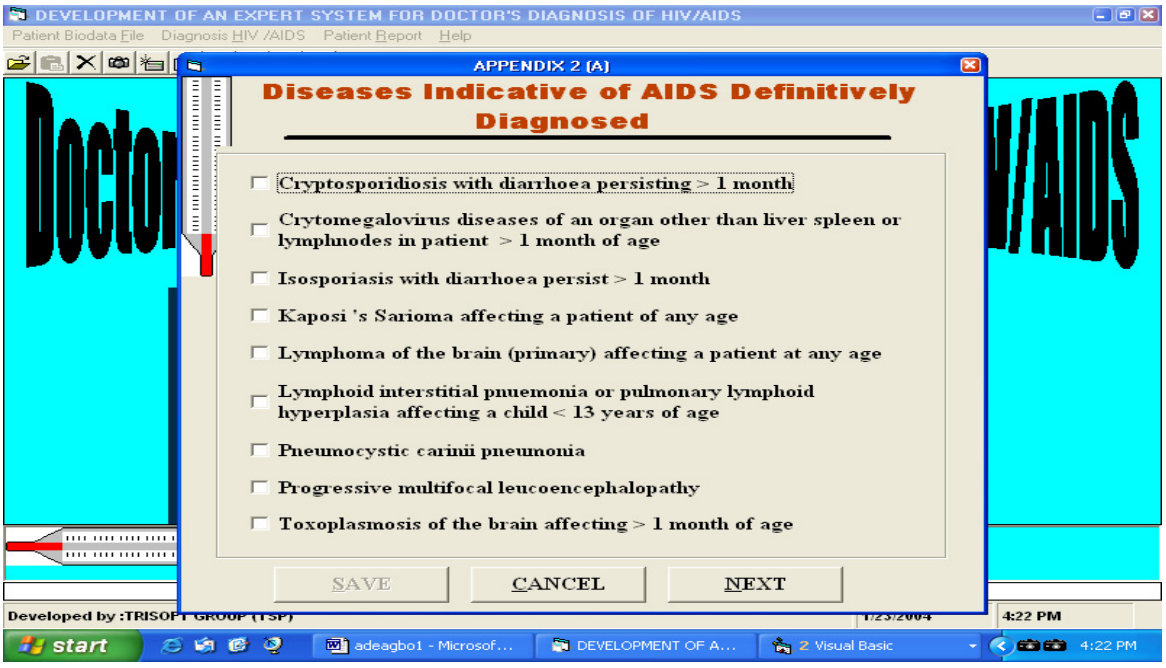

Figure 8.0 diseases indicative of AIDS Definitely Diagnosed

Figure 9.0 shows the template for the diseases indicative of AIDS Definitely Diagnosed.

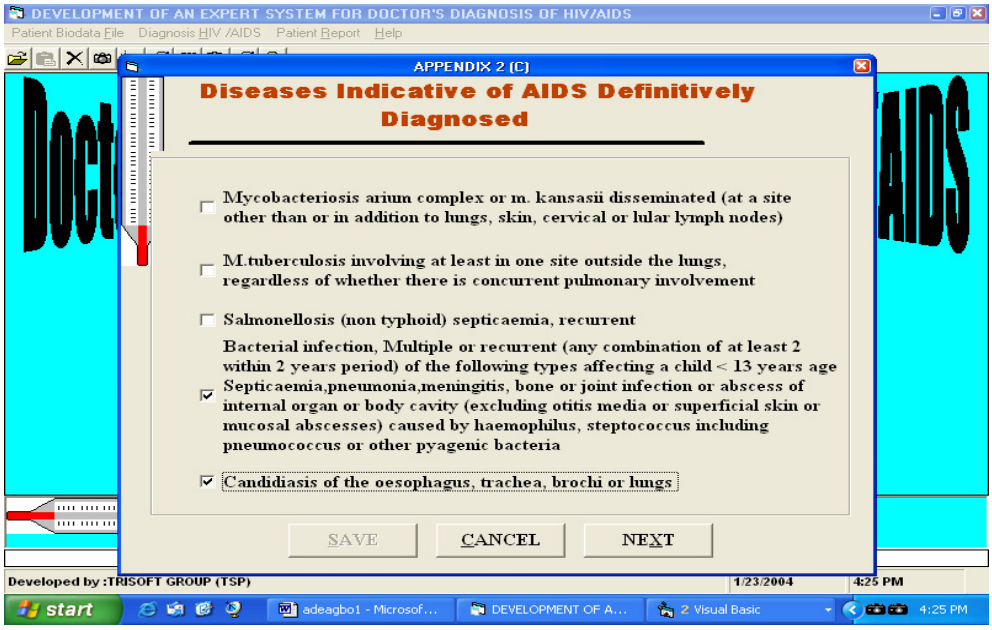

Figure 9.0 Diseases indicative of AIDS

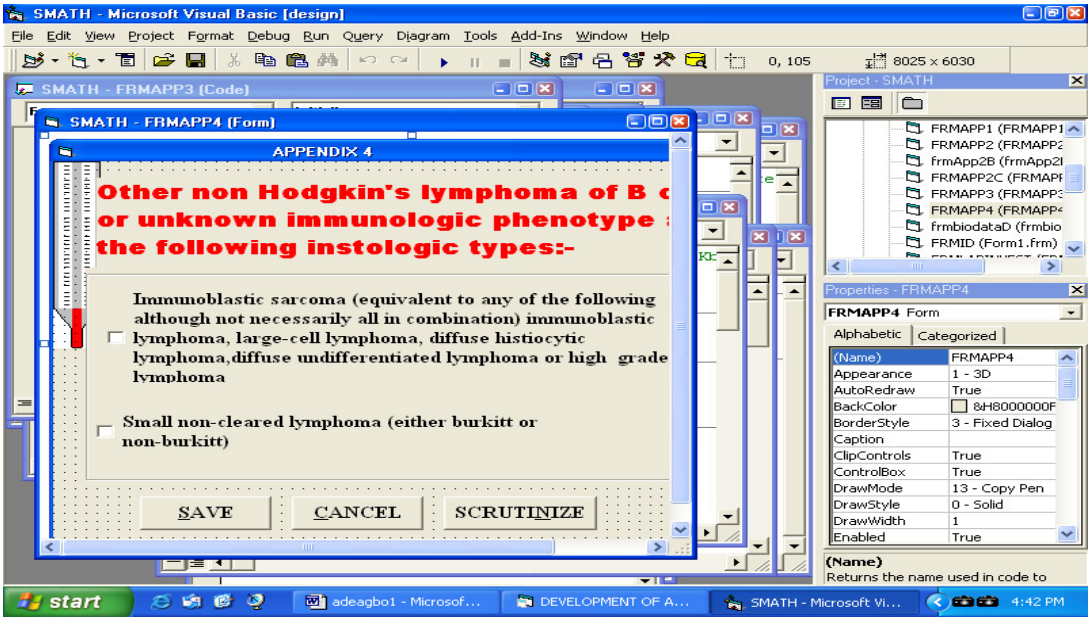

Figure 10.0 Unknown immunologic phenotype

Figure 10.0 shows other non hodgkins lymphoma or unknown immunologic phenotype of the patients.[4]

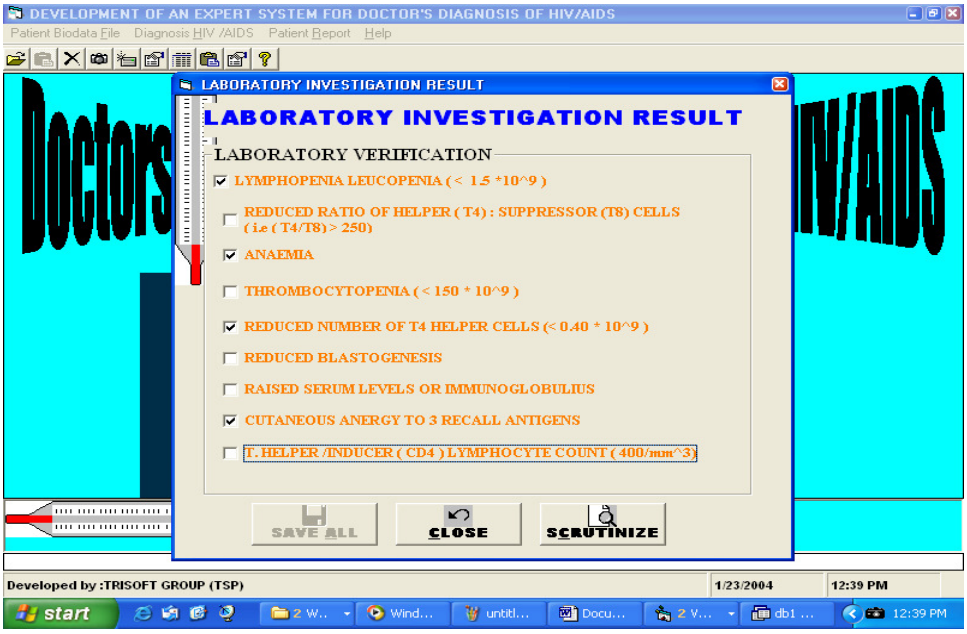

Figure 11.0 laboratory Investigation Result

Figure 11.0 shows the screen shots for the confirmation of laboratory Investigation Result in order to finally confirm the patients either HIV positive or not . With the data in the system it now will diagnose the problem and come up with Result as in fig 12.0

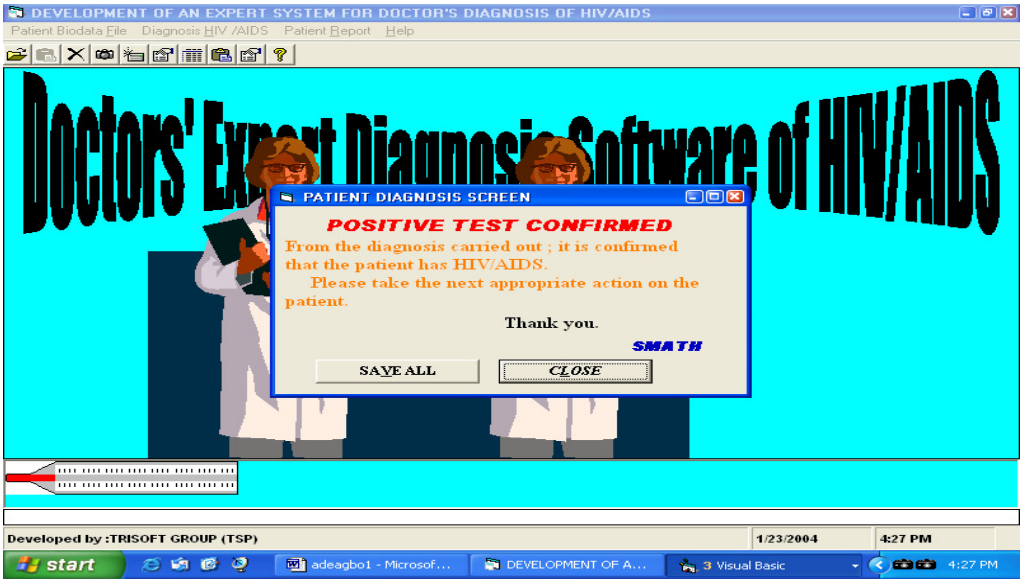

Figure 12.0 Confirmation Report

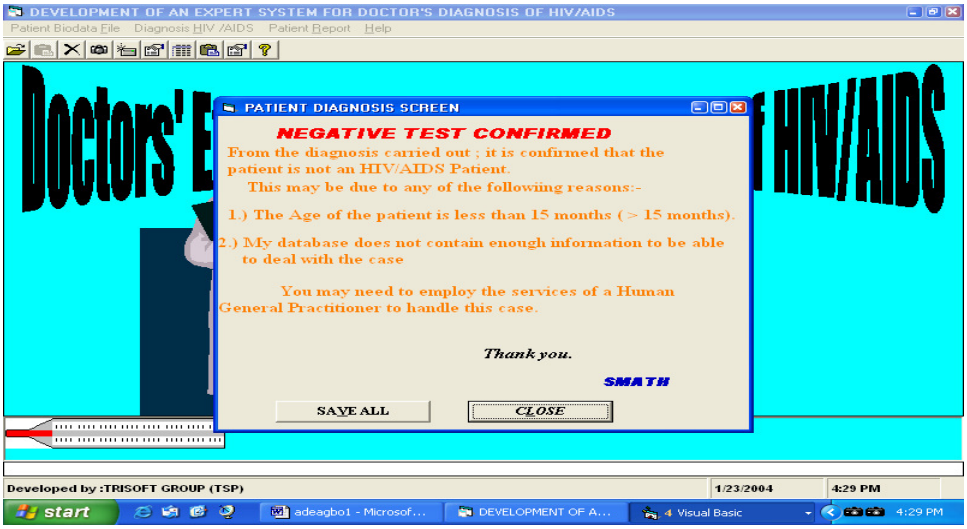

Figure 13.0 Negative Test Confirmed

Figure 13.0 shows the negative confirmation of the patients as AIDS carrier , the several figures above shows several steps that the system will take in order to arrive at its decision as whether a patients is HIV positive or not. Moreover, the following reports can be generated[7]

1. HIV Positive- Patient Reports – Figure 14.0
2. HIV Negative Patient Reports – Figure 15.0
3.

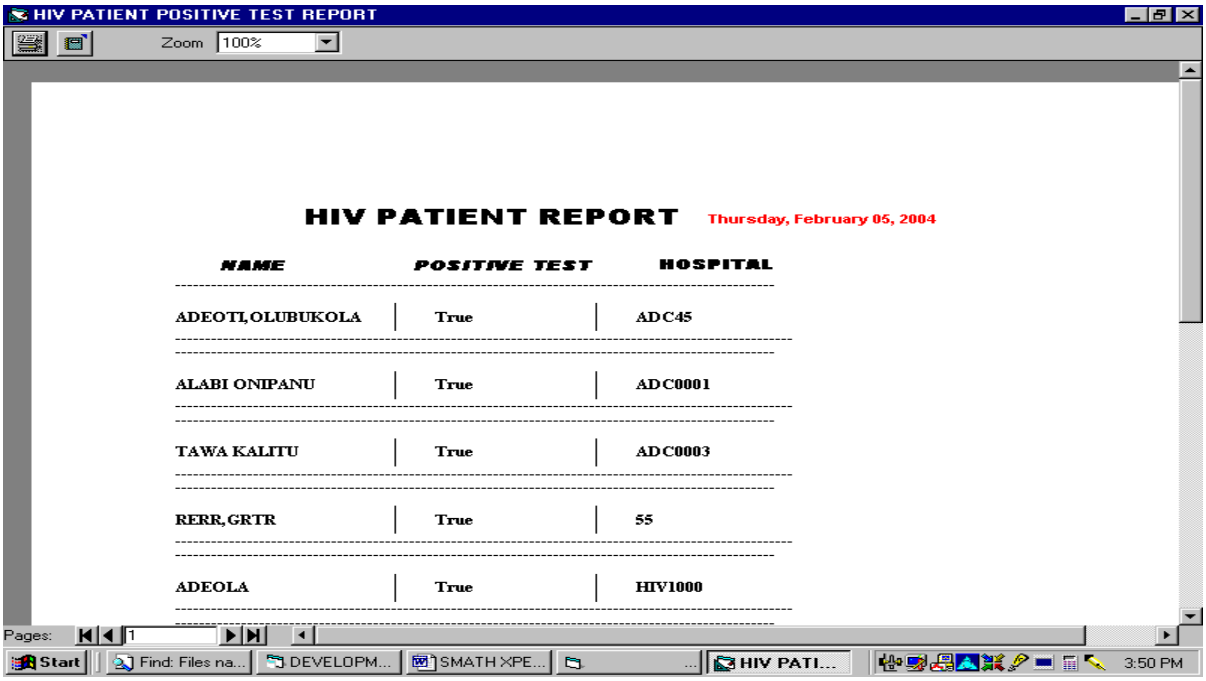

Figure 14.0 HIV Positive- Patient Reports

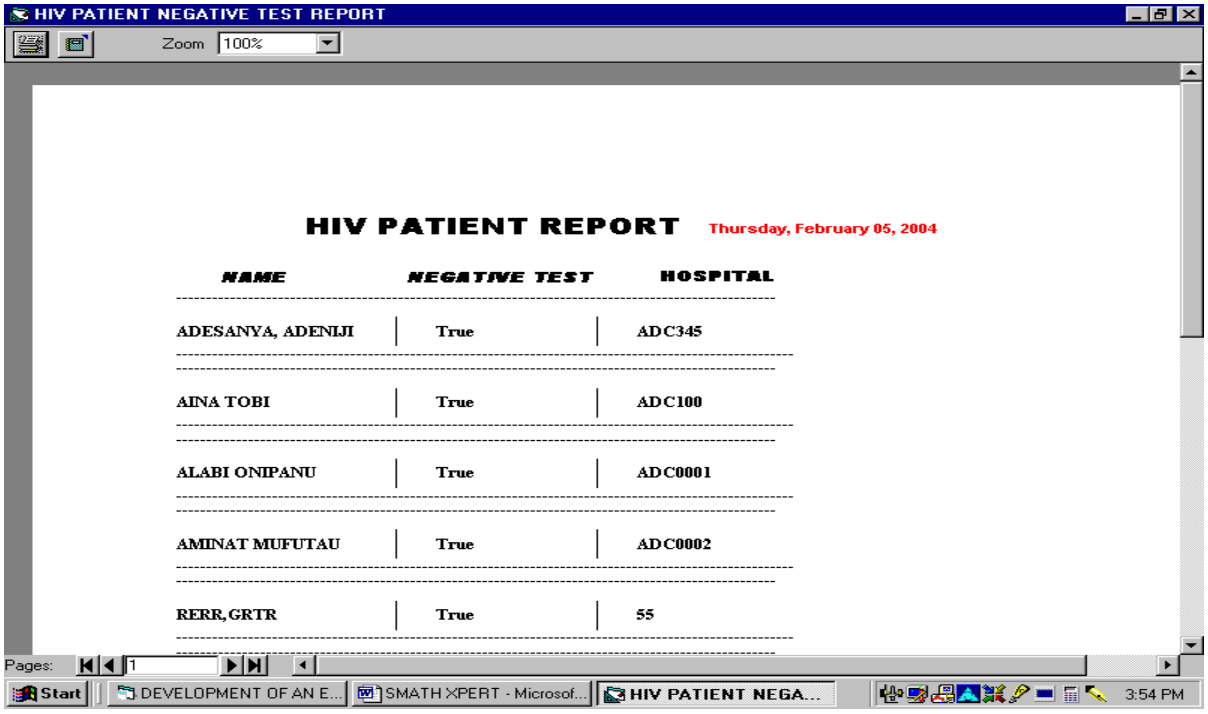

Figure 15.0 HIV –Negative Patients Report

4. CONCLUSION

The use of computer at all levels of Healthcare delivery should be encouraged since, its use in medical field will not only reduces human labour it will also bring about accurate and faster results. An increase in the use of computer as Expert System for diagnosis could also improve both the quality of medical care and the function of the new system as well as assist in providing counseling to prevent transmission of HIV [8]. However, the users should be well trained before using the system. This Development is Expert System packages that can diagnosis a particular disease – HIV/AIDS, if there are complications that the system cannot handle, it will refer the patient to a Human Physician. It has facilities for database that modification to update and delete records.[9] The development requires consulting experts who are directly and indirectly involved with the fields. This task is tedious and complex, but never the less it is important to serve as a vital need in that particular domain especially in the absence of human expert.

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