2. Review of literature:

(Stephen, 2009): Factors that contribute to the development of drug resistant strains of Mycobacterium tuberculosis include inappropriate treatment, such as not including 4 drugs in the initial regimen, not including a minimum of 2 drugs that the organism is sensitive to, and not treating for an adequate duration. Important components of TB management include prevention of infection, rapid diagnosis, appropriate and prompt therapy, drug susceptibility testing, and measures to optimize adherence to therapy. The author says that multidrug-resistant TB regimens should use all effective first-line drugs, an injectable agent, a fluoroquinolone, and other second-line and third-line drugs, aiming for a minimum of 4 effective drugs.

(Nurminen et al., 1980): In the present communication an analysis of illustrative data from a hypothetical case-compeer study was attempted with the estimation of rate ratios and the use of a log-linear model fitting technique. These analyses allow a parametric representation of the testable models. For adequate material they might provide tentative insight as to whether the data would conform more closely to an additive model than to a multiplicative one or to some other advocated pattern of action.

(Holmes et al., 1998): Globally, the prevalence of infection with Mycobacterium tuberculosis is similar in males and females until adolescence, after which it is higher in males. In industrialized countries in the middle of this century (1930s to 1950s), females aged 15 to 34 years had higher tuberculosis notification rates than males of the same age. The paper speaks about the sex differences in TB epidemiology and suggests that National Tuberculosis Programmes must assess possible sex differences that exist in their countries. In addition, information about the risks of tuberculosis in younger women should be incorporated into maternal and child health, and HIV/AIDS programmes.

(Sharkey, 2008): In this paper, a class of approximate deterministic models is introduced into the field of epidemiology that reduces this state space to one that is numerically feasible. The method is exemplified in the case of an SIR (susceptible-infectious-removed) epidemiological model and is numerically evaluated on a range of networks from spatially local to random. The paper assists
in clarifying the link between stochastic simulation and traditional population level deterministic models.

(Blower et al., 2004): Hot zones are areas that have >5% prevalence (or incidence) of multidrug-resistant tuberculosis (MDRTB). The paper presents a new mathematical model (the amplifier model) that tracks the emergence and evolution of multiple (pre-MDR, MDR and post-MDR) strains of drug-resistant Mycobacterium tuberculosis. The analysis gives three important insights and concludes that to effectively control MDRTB in the hot zones, it is essential that the WHO specify a goal for minimizing the amplification probability.

(Udwadia et al., 2010): This paper concludes that with a vast majority of private practitioners unable to provide a correct prescription for treating TB and not approached by the national TB programme, little seems to have changed over the years. Strategies to control TB should have large scale implementation of public-private mix approaches as a top priority for the programme. Ignoring the private sector could worsen the epidemic of multidrug-resistant and extensively drug-resistant forms of TB.

(Chigbu et al., 2010): In this paper the study was undertaken to determine transmission of Mycobacterium tuberculosis within the prison environment. From the data collected, the paper comments that duration of imprisonment did not influence the rates of infection, and the transmission of Mycobacterium tuberculosis did not necessarily require sharing a cell with a TB case.

(Breiman et al., 2011): A healthcare-use survey was conducted in the Kibera informal settlement in Nairobi, Kenya, in July 2005 to inform subsequent surveillance in the site for infectious diseases. The findings support community-based rather than facility-based surveillance in this setting to achieve objectives for comprehensive assessment of the burden of disease.

(Alp et al., 2010): A case of pneumatosis intestinalis and portal venous gas associated with abdominal tuberculosis in a child is presented in this paper. It is recommended that cases with pneumatosis intestinalis should be carefully observed, although symptoms appear to be improving.
(Ghosh et al., 2004): Many infectious diseases spread by carriers such as flies, ticks, mites, snails, etc. In this paper, an SIS model for carrier-dependent infectious diseases, like cholera, diarrhea, etc. caused by direct contact of susceptibles with infectives as well as by carriers is proposed and analyzed assuming the growth of both the human and the carrier populations logistic. It is assumed further that the density of carrier population increases with the increase in the cumulative density of discharges by the human population into the environment. The mathematical model is analyzed using usual theory of differential equations and computer simulation. By computer simulation, the paper is concluded with that if the growth of carrier population caused by conducive household discharges increases the spread of the infectious disease increases.

(Caylà et al., 2011): It was found that in areas with a ratio lower than one nurse per forty notifications had increased rates with respect to TB notifications, smear-positive cases, loss to follow-up and treatment abandonment across UK. Furthermore, in these areas there was less opportunity for directly observed therapy, assistance with complex needs, educational outreach and newentrant screening. In this commentary, the authors discuss the importance of improving organizational aspects and evaluating TB control programs.

(Bellan, 2010): The transmission of an infectious disease involves interactions between people. For a given disease, the rate at which infections arise depends on past interactions between infected and susceptible people. Thus, the rate at which people become infected depends on the history of the infection in the population. The paper discusses dynamic mathematical modelling for the analysis of systems in which rates of change depend on the quantities that are themselves changing.

(Curriea et al., 2003): To compare the benefits of tuberculosis (TB) treatment with TB and HIV prevention for the control of TB in regions with high HIV prevalence, a compartmental difference equation model of TB and HIV has been developed and fitted to time series and other published data using Bayesian methods. The model is used to compare the effectiveness of TB chemotherapy with three strategies for prevention: highly active antiretroviral therapy (HAART), the treatment of latent TB infection (TLTI) and the reduction of HIV transmission.
(Nigatu et al., 2010): A time-series study design was applied to analyze the ten-year trends of Tuberculosis in Ethiopia. Data on ten-key indicators for the period of 2000-2009 was obtained from the Ministry of Health public documents. Five stratifying variables were used to analyze the trends in the key TB indicators. The data on the indicators have undergone five stages of analysis: Aggregation, computation, summarization, graphics and model fitting. The paper concludes that urban agro-ecological zones have been more affected by the disease throughout the ten-year period. Extra-pulmonary rate and smear-negativity has shown a modest increment during the study period.

(Colebunders et al., 2000): In this paper, the authors say that their approach to smear-negative pulmonary TB must adapt to the HIV co-infection parameters. Management algorithms based on several features (clinical symptoms, response to antibiotic trials, smear investigations, and chest radiography) have been developed to improve case detection. These algorithms must be validated in each locale because their performance will vary depending on numerous local factors such as the regional prevalence of PCP. Alternative methods of specimen collection, such as sputum induction, and processing must be evaluated.

(Singla et al., 2009): The authors have conducted a Prospective case-control study. The profile of new Pulmonary TB patients failing treatment (i.e., sputum smear-positive at 5 months of treatment) and responders under the Revised National Tuberculosis Control Programme (RNTCP) were compared and risk factors associated with treatment failure were analysed. Based on the observations of the failures, they conclude that the presence of cavity on CXR, sputum smear positivity at 2 months of treatment and the number of interruptions of treatment are risk factors for failure. Among failures based on smear examination, the prevalence of MDR-TB is low and many patients have negative cultures for M. tuberculosis.

(D’souza et al., 2009): The paper concludes that levels of MDRTB are much higher in both previously untreated and first line treatment-failure cases in the selected wards in Mumbai than those projected by national estimates. The finding of amplified drug resistance suggests the presence of a well entrenched MDRTB scenario.
(Koole et al., 2011): In this paper, the authors prove that the diagnostic accuracy of the 2007 WHO guideline to diagnose smear-negative TB is acceptable. Pending point-of-care rapid diagnostic tests for TB disease, diagnostic algorithms are needed. There is, however, reluctance to comply with the guideline in terms of immediate treatment initiation.

(Atre et al., 2011): The objective of this paper is to assess risk factors associated with MDR - TB among Category I, new sputum smear-positive cases, at the onset of therapy. The study applied an unmatched case - control design for 514 patients (106 cases with MDR - TB strains and 408 controls with non - MDR - TB strains). The patients were registered with the Revised National Tuberculosis Control Program (RNTCP) in four selected wards of Mumbai during April 2004 - January 2007. Data were collected through semi - structured interviews and drug susceptibility test results. Multivariate analysis indicated that infection with the Beijing strain (OR = 3.06; 95% C.I. = 1.12 - 8.38; P = 0.029) and female gender (OR = 1.68; 95% C.I. = 1.02 - 2.87; P = 0.042) were significant predictors of MDR-TB at the onset of therapy.

(Liard et al., 1996): The objective of this paper was to estimate the annual tuberculous infection rate in Tamanrasset (southern Algeria) by applying on the one hand the classical method of the Tuberculosis Surveillance Research Unit (TSRU) of the International Union Against Tuberculosis, and on the other the study of variations of allergy published by Raj Narain et al. The findings of this paper suggest that the study of variations of allergy might be a good alternative approach to estimate the annual infection rate in countries where children are BCG-vaccinated at birth, which is the case for most developing countries.

(Coker et al., 2010): In this paper, a conceptual framework and an analytical methodology is proposed which might be used to comparatively analyse a series of case studies that explore health systems, communicable diseases programmes and concepts of integration in order to make systematic comparisons. A preliminary analysis is used to illustrate how this framework can be applied to compare the impact of health systems integration and HIV and TB programmes in four countries in South-East Asia that were the subject of cases studies.
(Conseil et al., 2010): This case study on Vietnam aims to generate empirical evidence on the relative merits of integration of two priority health interventions, HIV/AIDS and tuberculosis (TB), into six functions of the wider health system listed in the paper. Data collected were collated and evaluated against 25 elements of integration. Each element of integration was ultimately classified as being ‘fully/predominantly integrated’, ‘partially integrated’, ‘not or predominantly not integrated’. The results showed that none of the six programme functions was fully integrated into the general health care system as a whole. They were established either in parallel, notably at higher administrative levels, or were partially integrated.

(Sophia Vijay et al., 2004): A prospective cohort study of 271 new smear and culture positive patients initiated on Cat I from April to December 1999 and followed up till treatment outcome and 2&1/2 years thereafter 1) To evaluate the treatment outcome of new smear positive patients supported with pre and post-treatment bacteriological profile and 2) To assess their bacteriological and clinical status two and half years after treatment initiation. Conclusion drawn was fully intermittent CAT I regimen was effective in programme conditions, irrespective of the pre-treatment drug susceptibility status. The study findings underscore the importance of strict adherence to the programme guidelines for successful treatment completion and a lasting cure.

(Messeen et al., 2011): In this study, recent reforms in six sub-Saharan African countries are reviewed. The analysis shows that African leaders are willing to take strong action to remove financial barriers met by vulnerable groups, especially pregnant women and children. Mobilizing sufficient financial resources and obtaining long-term commitment are obviously crucial requirements, but design details, the formulation process and implementation plan also need careful thought. In this paper, the authors contend that national policy-makers and international agencies could better collaborate in this respect.

(Anomaly et al., 2011): According to the authors, they should reclaim the more traditional conception of public health as the provision of health-related public goods. The public goods account has the advantage of establishing a relatively clear and distinctive mission for public health.
(Mathew et al., 2012): In this paper, the study was to determine whether tuberculosis is seasonal in the United States and to describe patterns of seasonality in specific populations. Finally, they conclude that tuberculosis is a seasonal disease in the United States, with a peak in spring and trough in late fall. The latitude independence of seasonality may not be due to reduced winter sunlight exposure. The recent transmission of the disease is more influenced by season than due to activation of latent infection.

(Mohtashemi et al., 2010): This paper proves the hypothesis that the dynamics of HIV and TB are significantly intertwined and that HIV is likely a key factor in the sustenance of TB transmission among the San Francisco homeless. The findings of this study underscore the importance of contact tracing in detection of HIV+ individuals. The authors conclude that there is an ever-increasing need for HIV-related data and an integrative approach to monitoring high-risk populations with respect to HIV and TB transmission.

(Tumbo, 2011): A cross-sectional, descriptive study was conducted in 2008. The aim of the study was to evaluate the use of DOT for TB in the Bojanala health district, North West Province, South Africa, by estimating the proportion of DOT use (1) amongst all TB patients and (2) in the initial TB treatment regimen compared to retreatment regimens. In this South African rural health district, the DOT utilisation rate for TB was 56.8%, mainly for patients on the TB retreatment regimen. Strict implementation of DOT in all patients undergoing TB treatment is a known strategy for improving TB cure rate and preventing recurrence and drug resistance.

(Johnstone-Robertson, 2012): This research was performed to investigate the role various parameters, e.g. overcrowding, period of infectivity, ventilation, and infectivity of source cases, play in TB transmission. An established airborne transmission risk model, the Wells-Riley equation (WRE), was modified to account for scenarios where unknown numbers of infectious individuals may be present. Subsequently, the ARI for three indoor locations conducive to TB transmission were calculated: Households, Minibus taxis and Prison. Poor ventilation, severe overcrowding, extended exposure periods, and high incidence rates contributed to high TB transmission risks in each location. The author suggests that current TB control programs will only reduce the ARI by i) improving household ventilation levels, ii) trebling current ventilation levels
or by separating child and adult sleeping areas, iii) opening windows or keeping the fresh-air fan on in minibus taxis, iv) improving ventilation, decreasing lock-up time, or improving case-finding in prison.

( Cohen et al., 2004): Assuming that the relative fitness of MDR strains is heterogeneous, in this paper, the authors model the impact of initial fitness estimates on the emergence of MDRTB. They found that even when the average relative fitness of MDR strains is low and a well-functioning control program is in place, a small subpopulation of a relatively fit MDR strain may eventually outcompete both the drug-sensitive strains and the less fit MDR strains. These results imply that current epidemiological measures and short-term trends in the burden of MDRTB do not provide evidence that MDRTB strains can be contained in the absence of specific efforts to limit transmission from those with MDR disease.

(Rundi, 2010): Malaysia is a country with the intermediate burden of tuberculosis (TB). A qualitative study, by conducting a Purposive sampling, was conducted in 2006 in seven districts in Sabah to assess the knowledge and perceptions of TB patients and the community about TB, also to know the experiences of healthcare services, and to examine the impact of TB on patients and families. Data were analyzed using thematic content analysis. Ninety-six percent of the respondents did not know the cause of TB. So, the author concludes that there is a need to understand the reasons for the misconceptions about TB and to address the lack of knowledge on TB through health education. Patients need to recognize the symptoms of TB early so that prompt treatment can be initiated, and patients need to be convinced of its curability.