



SDI Review Form 1.6

PART 1:

Journal Name:	<u>British Journal of Mathematics & Computer Science</u>
Manuscript Number:	2013_BJMCS_4681
Title of the Manuscript:	ANALYSIS OF TRANSMISSION DYNAMICS OF TUBERCULOSIS (TB) USING DIFFERENTIAL EQUATIONS: A CASE STUDY OF AMANSIE WEST DISTRICT, GHANA
Type of the Article	Research paper

General guideline for Peer Review process is available in this link:

(<http://www.sciencedomain.org/page.php?id=sdi-general-editorial-policy#Peer-Review-Guideline>)

- This form has total 7 parts. Kindly note that you should use all the parts of this review form.



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PART 2: Review Comments

	Reviewer's comment	Author's comment <i>(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)</i>
<u>Compulsory</u> REVISION comments	- The title of the paper is too general yet the model used was targeted on a specific province. Basing on the conclusions drawn from the study (Lines 499-501), I suggest that the title be re-phrased to "A mathematical model to predict the prevalence and transmission dynamics of Tuberculosis in Amanse West District, Ghana". - Line 14 reads "Using the stability theory and computer simulation, it was observed that the number of immunized individuals in the population will increase the level of immunity". However, going through the paper, I have failed to locate where these results were drawn from, since the model wasn't a within host model. - The compartmental model Figure 1, which is after line 173 needs to be revised completely. One should be able to come up with the complete set of Ordinary Differential Equations from the compartmental model. I suggest that all parameters used in the model should be explained when they are first used. - Line 182, model assumptions number 3. The authors assume that once an individual is infected, he or she becomes infected exposed to the environment before becoming infectious. However, according to literature and to Figure 1, exposure is always first, before one becomes infectious. Maybe the authors wanted to say that "An individual is firstly exposed to the disease through interaction with the infectious but doesn't become infectious instantly". - Line 184, model assumption number 4. I don't think the assumption made by the authors is realistic. They are assuming that there is neither birth nor death in the population yet in line 198, the authors assumed that "The birth and death rate is μ". It appears the formulation of the model equations is not in sync with the compartmental model, Figure 1.	Addressed.



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	• Line 205. The authors are saying that the term $\beta SI/N$ is negative yet all the variables and parameters are positive. Where is this coming from? • Line 210. The rate at which an exposed individual becomes infectious is ϵ and not ϵE. • Line 213. The rate at which an infected individual may recover is γ and not γI. • Line 270. Where is equation (12) coming from and there is need to explain it since it is a very important result. • Line 281, equation (13). The authors just stated the equation. There is need to explain it in line with their study. • Line 289, equation 14. No explanation was given as to why r^* was dropped from the solution. There is also need to discuss in detail results in line 289 and line 292. • Lines 311-314. The authors give us the conditions that have to be satisfied for the stability of the DFE, but they don't go on to show us that they are satisfied. This has to be shown in detail. • Line 329. Authors refer to equation 3.41 which is not in the paper. • Table 3, line 345 shows some parameters with their values. Were they obtained from the data set used or they are from some published sources. It should be indicated whether the parameters were, estimated, calculated or obtained from other sources. • Line 361. The calculated value of R_0 is 1.09305 which is very low as compared to the earlier assertion by the authors that one index case can infect about 15 people in unit time. More explanation is needed. Maybe its rescaled!!! • What is the meaning of the results obtained in line 382 and all other results that follow? • Line 461. The authors are saying that the number of susceptibles is constant at 500 throughout, yet it is increasing. • Line 468. According to Figure 4, the number of susceptibles keeps on increasing and is not constant as suggested by the authors. • Lines 469-470. The authors are saying "There is also, no effect on the exposed individuals and the 10 infected reduced with time to zero". This statement is against the Routh-Hurwitz stability analysis results in this paper.	
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<u>Minor</u> REVISION comments	1) Equation number should appear in the same line with the equation. Check lines 223, 247, 249, and many more. 2) Line 267 reads “..... basic reproductive number for this thesis” should read “..... basic reproductive number for the model” 3) The whole document needs revision on punctuation and grammatical errors.	Addressed.
<u>Optional/General</u> comments	The authors did a great job in coming up with this paper. A lot of work has been done on the transmission dynamics of TB by many other authors and in this paper, the authors had tried to localise the model. However, there is no scientific justification of a problem. The authors did not state clearly the problem they want to solve but however a number of mathematical methods were used without linking them to the problem at hand. Also, the results mentioned are not justified by the methods used in the paper.	Addressed.