

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

PREDICTION FOR PROGRESSION OF
RIVER BLINDNESS BY USING SIR MODEL

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ABSTRACT

River blindness disease become a major problem in Northern Nigeria, Africa especially in a rural agricultural located nearby river's edge. The population is at higher risk infected for very close to the breeding site of black fly or known as *Simulium damnosum*. The infected black fly caused the transmission of parasite to human body. This study focused on solving the River Blindness disease using SIR model with vital dynamic. Solving the ordinary differential equation (ODE) by using steady state theorem to identify the change percentage of susceptible, infected and recovery for the population in Northern Nigeria, Africa in a time period. The initial percentage of susceptible is 0.65 of the population, but only 0.01 of the susceptible individuals are infected to the disease and 0 of them are recovered. The progression of the disease after 90 days is predicted using Euler Method in *Matlab*.

1 INTRODUCTION

1.1 Research Background

River blindness is also known as *Onchocerciasis*. This disease caused by parasite *Onchocerca volvulus* (worm) that found deeper in tissues of human body as shown in Figure 1.1. Females parasite released about 700-1500 microfilariae per day, and mostly found in the skin, eyes and other tissues. The microfilariae transmitted from the bite of the black fly (vector) and ingested. This caused the microfilariae develop into infective larvae and transmitted again to human body by the bite of the infectious black fly. According to study by Hopkins & Boatman (2011) about a year, the larvae develop into adult parasite and the cycle begins. The Figure 1.2 shows the transmission of the disease by the parasite and also by humans.



Figure 1.1: The parasite *Onchocerca volvulus* (worm)