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L A M P I R A N

```
%Lampiran 1. program menghitung resiko tertular covid-19 kasus: di
dalam bus
%Nur Darmayanthy
%Pembimbing : Halmar Halide dan Alimuddin Hamzah
%Dept Geofisika FMIPA Unhas
%Infeksi 1

%suhu
T1 = 18
T2 = 22
T3 = 26
RH = 55%dalam persen, min:20, med:40, max:70
UV = 0 %tanpa satuan, min:0, med:2.5, max:3.5
decay_rate_of_this_virus_1=(7.569+1.411*((T1-20.54)/10.66)+
0.022*((RH-45.235)/28.665)+...
                            7.553*(((UV*0.9)-50)/50)+1.397*((T1-
20.54)/10.66)*(((UV*0.9)-50)/50))*60 %(Dabisch P. dkk., 2020)
decay_rate_of_this_virus_2=(7.569+1.411*((T2-20.54)/10.66)+
0.022*((RH-45.235)/28.665)+...
                            7.553*(((UV*0.9)-50)/50)+1.397*((T2-
20.54)/10.66)*(((UV*0.9)-50)/50))*60%(Dabisch P. dkk., 2020)
decay_rate_of_this_virus_3=(7.569+1.411*((T3-20.54)/10.66)+
0.022*((RH-45.235)/28.665)+...
                            7.553*(((UV*0.9)-50)/50)+1.397*((T3-
20.54)/10.66)*(((UV*0.9)-50)/50))*60 %(Dabisch P. dkk., 2020)

ventilation_outside_air=4 % satuan h-1, min:2, med:4, max:6
deposition_to_surface=0.3
additional_control_measures=0

exhalation_mask_efficiency=0.4 %satuan persen
fraction_of_people_mask=1 %satuan persen

panjang = 9 %meter
lebar = 2.1 %meter
tinggi = 3 %meter
volume =  panjang*lebar*tinggi% satuan m3
duration_of_event = 720 %satuan menit
Durasi = 0:1:duration_of_event./60 %satuan jam

jarak = 0.65
prob_social_distance = (-18.19*log(jarak)+43.276)/100 %rumus (10).
)Sun C. dan Zhai Z, 2020).
quanta_exhalation_rate = 3.1
quanta_exhalation_rate_new =
quanta_exhalation_rate.*prob_social_distance

breathing_rate=0.54
inhalation_mask_efficiency = 0.3
number_of_repetition_event=1
prob_of_being_infective=0.007

jumlah_orang = 18
infective_people = 1
fraction_of_population_inmune = 0
```

```
susceptible_people= (jumlah_orang - infective_people)*(1-
fraction_of_population_inmune)

Total_first_order_loss_rate_1 = ventilation_outside_air +
decay_rate_of_this_virus_1 + deposition_to_surface +
additional_control_measures
Total_first_order_loss_rate_2 = ventilation_outside_air +
decay_rate_of_this_virus_2 + deposition_to_surface +
additional_control_measures
Total_first_order_loss_rate_3 = ventilation_outside_air +
decay_rate_of_this_virus_3 + deposition_to_surface +
additional_control_measures

Net_emission_rate = quanta_exhalation_rate_new.*(1 -
exhalation_mask_efficiency.*fraction_of_people_mask).*infective_pe
ople

Avg_quanta_concentration_1 =
Net_emission_rate./Total_first_order_loss_rate_1./volume.*(1-
(1/Total_first_order_loss_rate_1./Durasi).*(1 - exp(-
Total_first_order_loss_rate_1.*Durasi)))
Avg_quanta_concentration_2 =
Net_emission_rate./Total_first_order_loss_rate_2./volume.*(1-
(1/Total_first_order_loss_rate_2./Durasi).*(1 - exp(-
Total_first_order_loss_rate_2.*Durasi)))
Avg_quanta_concentration_3 =
Net_emission_rate./Total_first_order_loss_rate_3./volume.*(1-
(1/Total_first_order_loss_rate_3./Durasi).*(1 - exp(-
Total_first_order_loss_rate_3.*Durasi)))

Quanta_inhale_per_person_1 =
Avg_quanta_concentration_1.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
Quanta_inhale_per_person_2 =
Avg_quanta_concentration_2.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
Quanta_inhale_per_person_3 =
Avg_quanta_concentration_3.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)

Infeksi_1a = 1-exp(-Quanta_inhale_per_person_1)
Infeksi_1b = 1-exp(-Quanta_inhale_per_person_2)
Infeksi_1c = 1-exp(-Quanta_inhale_per_person_3)

Infeksi_2a = 1 - (1 -
Infeksi_1a.*prob_of_being_infective).^susceptible_people
Infeksi_2b = 1 - (1 -
Infeksi_1b.*prob_of_being_infective).^susceptible_people
Infeksi_2c = 1 - (1 -
Infeksi_1c.*prob_of_being_infective).^susceptible_people

Infeksi_3a = 1 - (1 - Infeksi_2a).^ number_of_repetition_event
Infeksi_3b = 1 - (1 - Infeksi_2b).^ number_of_repetition_event
Infeksi_3c = 1 - (1 - Infeksi_2c).^ number_of_repetition_event
```

```
hasil1a=Infeksi_1a*100
hasil2a=Infeksi_2a*100
hasil3a=Infeksi_3a*100

hasil1b=Infeksi_1b*100
hasil2b=Infeksi_2b*100
hasil3b=Infeksi_3b*100

hasil1c=Infeksi_1c*100
hasil2c=Infeksi_2c*100
hasil3c=Infeksi_3c*100

plot(Durasi, hasil3a,'-*b', Durasi, hasil3b,'-*r', Durasi,
hasil3c,'-*g')
xlabel('Durasi (jam)')
ylabel('Risiko Terinfeksi (%)')
xlim([1 12])
ylim([0 0.5])
title({'Pengaruh Suhu terhadap Risiko Terinfeksi Aerosol SARS-CoV-
2'; 'di dalam Bus'})
legend({'suhu = 18C', 'suhu = 22C','suhu = 26C'})

%%

%RH
RH1 = 35
RH2 = 55
RH3 = 75
T = 22
UV = 0 %tanpa satuan, mini:0, med:2.5, max:4
decay_rate_of_this_virus_1=(7.569+1.411*((T-20.54)/10.66)+
0.022*((RH1-45.235)/28.665)+...
                          7.553*(((UV*0.9)-50)/50)+1.397*((T-
20.54)/10.66)*(((UV*0.9)-50)/50))*60 %(Dabisch P. dkk., 2020)
decay_rate_of_this_virus_2=(7.569+1.411*((T-20.54)/10.66)+
0.022*((RH2-45.235)/28.665)+...
                          7.553*(((UV*0.9)-50)/50)+1.397*((T-
20.54)/10.66)*(((UV*0.9)-50)/50))*60%(Dabisch P. dkk., 2020)
decay_rate_of_this_virus_3=(7.569+1.411*((T-20.54)/10.66)+
0.022*((RH3-45.235)/28.665)+...
                          7.553*(((UV*0.9)-50)/50)+1.397*((T-
20.54)/10.66)*(((UV*0.9)-50)/50))*60 %(Dabisch P. dkk., 2020)

ventilation_outside_air=4 % satuan h-1, min:2, med:4, max:6
deposition_to_surface=0.3
additional_control_measures=0

exhalation_mask_efficiency=0.4 %satuan persen
fraction_of_people_mask=1 %satuan persen

panjang = 9 %meter
lebar = 2.1 %meter
tinggi = 3 %meter
volume =  panjang*lebar*tinggi% satuan m3
duration_of_event = 720 %satuan jam
```

```
Durasi = 0:1:duration_of_event./60

jarak = 0.65
prob_social_distance = (-18.19*log(jarak)+43.276)/100 %rumus (10).
)Sun C. dan Zhai Z, 2020).
quanta_exhalation_rate = 3.1
quanta_exhalation_rate_new =
quanta_exhalation_rate.*prob_social_distance

breathing_rate=0.54
inhalation_mask_efficiency = 0.3
number_of_repetition_event=1
prob_of_being_infective=0.007

jumlah_orang = 18
infective_people = 1
fraction_of_population_inmune = 0
susceptible_people= (jumlah_orang - infective_people)*(1-
fraction_of_population_inmune)

Total_first_order_loss_rate_1 = ventilation_outside_air +
decay_rate_of_this_virus_1 + deposition_to_surface +
additional_control_measures
Total_first_order_loss_rate_2 = ventilation_outside_air +
decay_rate_of_this_virus_2 + deposition_to_surface +
additional_control_measures
Total_first_order_loss_rate_3 = ventilation_outside_air +
decay_rate_of_this_virus_3 + deposition_to_surface +
additional_control_measures

Net_emission_rate = quanta_exhalation_rate_new.*(1 -
exhalation_mask_efficiency.*fraction_of_people_mask).*infective_pe
ople

Avg_quanta_concentration_1 =
Net_emission_rate./Total_first_order_loss_rate_1./volume.*(1-
(1/Total_first_order_loss_rate_1./Durasi).*(1 - exp(-
Total_first_order_loss_rate_1.*Durasi)))
Avg_quanta_concentration_2 =
Net_emission_rate./Total_first_order_loss_rate_2./volume.*(1-
(1/Total_first_order_loss_rate_2./Durasi).*(1 - exp(-
Total_first_order_loss_rate_2.*Durasi)))
Avg_quanta_concentration_3 =
Net_emission_rate./Total_first_order_loss_rate_3./volume.*(1-
(1/Total_first_order_loss_rate_3./Durasi).*(1 - exp(-
Total_first_order_loss_rate_3.*Durasi)))

Quanta_inhale_per_person_1 =
Avg_quanta_concentration_1.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
Quanta_inhale_per_person_2 =
Avg_quanta_concentration_2.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
```

```
Quanta_inhale_per_person_3 =
Avg_quanta_concentration_3.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)

Infeksi_1a = 1-exp(-Quanta_inhale_per_person_1)
Infeksi_1b = 1-exp(-Quanta_inhale_per_person_2)
Infeksi_1c = 1-exp(-Quanta_inhale_per_person_3)

Infeksi_2a = 1 - (1 -
Infeksi_1a.*prob_of_being_infective).^susceptible_people
Infeksi_2b = 1 - (1 -
Infeksi_1b.*prob_of_being_infective).^susceptible_people
Infeksi_2c = 1 - (1 -
Infeksi_1c.*prob_of_being_infective).^susceptible_people

Infeksi_3a = 1 - (1 - Infeksi_2a).^ number_of_repetition_event
Infeksi_3b = 1 - (1 - Infeksi_2b).^ number_of_repetition_event
Infeksi_3c = 1 - (1 - Infeksi_2c).^ number_of_repetition_event

hasil1a=Infeksi_1a*100
hasil2a=Infeksi_2a*100
hasil3a=Infeksi_3a*100

hasil1b=Infeksi_1b*100
hasil2b=Infeksi_2b*100
hasil3b=Infeksi_3b*100

hasil1c=Infeksi_1c*100
hasil2c=Infeksi_2c*100
hasil3c=Infeksi_3c*100

plot(Durasi, hasil3a,'-*b', Durasi, hasil3b,'-*r', Durasi,
hasil3c,'-*g')
xlabel('Durasi (jam)')
ylabel('Risiko Terinfeksi (%)')
xlim([1 12])
ylim([0 0.5])
title({'Pengaruh RH terhadap Risiko Terinfeksi Aerosol SARS-CoV-
2'; 'di dalam Bus'})
legend('RH = 35%', 'RH = 55%','RH = 75%')

%%
%uv

RH = 55
T = 22
UV1 = 0 %tanpa satuan, mini:0, med:2.5, max:4
UV2 = 2.5
UV3 = 3.5
decay_rate_of_this_virus_1=(7.569+1.411*((T-20.54)/10.66)+
0.022*((RH-45.235)/28.665)+...
                          7.553*(((UV1*0.9)-50)/50)+1.397*((T-
20.54)/10.66)*(((UV1*0.9)-50)/50))*60 %(Dabisch P. dkk., 2020)
decay_rate_of_this_virus_2=(7.569+1.411*((T-20.54)/10.66)+
0.022*((RH-45.235)/28.665)+...
```

```
                          7.553*(((UV2*0.9)-50)/50)+1.397*((T-
20.54)/10.66)*(((UV2*0.9)-50)/50))*60%(Dabisch P. dkk., 2020)
decay_rate_of_this_virus_3=(7.569+1.411*((T-20.54)/10.66)+
0.022*((RH-45.235)/28.665)+...
                          7.553*(((UV3*0.9)-50)/50)+1.397*((T-
20.54)/10.66)*(((UV3*0.9)-50)/50))*60 %(Dabisch P. dkk., 2020)

ventilation_outside_air=4 % satuan h-1, min:2, med:4, max:6
deposition_to_surface=0.3
additional_control_measures=0

exhalation_mask_efficiency=0.4 %satuan persen
fraction_of_people_mask=1 %satuan persen

panjang = 9 %meter
lebar = 2.1 %meter
tinggi = 3 %meter
volume =  panjang*lebar*tinggi% satuan m3
duration_of_event = 720 %satuan jam
Durasi = 0:1:duration_of_event./60

jarak = 0.65
prob_social_distance = (-18.19*log(jarak)+43.276)/100 %rumus (10).
)Sun C. dan Zhai Z, 2020).
quanta_exhalation_rate = 3.1
quanta_exhalation_rate_new =
quanta_exhalation_rate.*prob_social_distance

breathing_rate=0.54
inhalation_mask_efficiency = 0.3
number_of_repetition_event=1
prob_of_being_infective=0.007

jumlah_orang = 18
infective_people = 1
fraction_of_population_inmune = 0
susceptible_people= (jumlah_orang - infective_people)*(1-
fraction_of_population_inmune)

Total_first_order_loss_rate_1 = ventilation_outside_air +
decay_rate_of_this_virus_1 + deposition_to_surface +
additional_control_measures
Total_first_order_loss_rate_2 = ventilation_outside_air +
decay_rate_of_this_virus_2 + deposition_to_surface +
additional_control_measures
Total_first_order_loss_rate_3 = ventilation_outside_air +
decay_rate_of_this_virus_3 + deposition_to_surface +
additional_control_measures

Net_emission_rate = quanta_exhalation_rate_new.*(1 -
exhalation_mask_efficiency.*fraction_of_people_mask).*infective_pe
ople

Avg_quanta_concentration_1 =
Net_emission_rate./Total_first_order_loss_rate_1./volume.*(1-
```

```
(1/Total_first_order_loss_rate_1./Durasi).*(1 - exp(-
Total_first_order_loss_rate_1.*Durasi)))
Avg_quanta_concentration_2 =
Net_emission_rate./Total_first_order_loss_rate_2./volume.*(1-
(1/Total_first_order_loss_rate_2./Durasi).*(1 - exp(-
Total_first_order_loss_rate_2.*Durasi)))
Avg_quanta_concentration_3 =
Net_emission_rate./Total_first_order_loss_rate_3./volume.*(1-
(1/Total_first_order_loss_rate_3./Durasi).*(1 - exp(-
Total_first_order_loss_rate_3.*Durasi)))

Quanta_inhale_per_person_1 =
Avg_quanta_concentration_1.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
Quanta_inhale_per_person_2 =
Avg_quanta_concentration_2.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
Quanta_inhale_per_person_3 =
Avg_quanta_concentration_3.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)

Infeksi_1a = 1-exp(-Quanta_inhale_per_person_1)
Infeksi_1b = 1-exp(-Quanta_inhale_per_person_2)
Infeksi_1c = 1-exp(-Quanta_inhale_per_person_3)

Infeksi_2a = 1 - (1 -
Infeksi_1a.*prob_of_being_infective).^susceptible_people
Infeksi_2b = 1 - (1 -
Infeksi_1b.*prob_of_being_infective).^susceptible_people
Infeksi_2c = 1 - (1 -
Infeksi_1c.*prob_of_being_infective).^susceptible_people

Infeksi_3a = 1 - (1 - Infeksi_2a).^ number_of_repetition_event
Infeksi_3b = 1 - (1 - Infeksi_2b).^ number_of_repetition_event
Infeksi_3c = 1 - (1 - Infeksi_2c).^ number_of_repetition_event

hasil1a=Infeksi_1a*100
hasil2a=Infeksi_2a*100
hasil3a=Infeksi_3a*100

hasil1b=Infeksi_1b*100
hasil2b=Infeksi_2b*100
hasil3b=Infeksi_3b*100

hasil1c=Infeksi_1c*100
hasil2c=Infeksi_2c*100
hasil3c=Infeksi_3c*100

plot(Durasi, hasil3a,'-*b', Durasi, hasil3b,'-*r', Durasi,
hasil3c,'-*g')
xlabel('Durasi (jam)')
ylabel('Risiko Terinfeksi (%)')
xlim([1 12])
ylim([0 0.5])
```

```
title({'Pengaruh Indeks UV terhadap Risiko Terinfeksi Aerosol
SARS-CoV-2'; 'di dalam Bus'})
legend('UV = 0', 'UV = 2.5','UV = 3.5')

%%

%jarak

T = 22
RH = 55%dalam persen, mini:20, med:50, max:70
UV = 0 %tanpa satuan, mini:0, med:2.5, max:4
decay_rate_of_this_virus=(7.569+1.411*((T-20.54)/10.66)+
0.022*((RH-45.235)/28.665)+...
                            7.553*(((UV*0.9)-50)/50)+1.397*((T-
20.54)/10.66)*(((UV*0.9)-50)/50))*60 %(Dabisch P. dkk., 2020)

ventilation_outside_air=4 % satuan h-1, min:2, med:4, max:6
deposition_to_surface=0.3
additional_control_measures=0

exhalation_mask_efficiency=0.4 %satuan persen
fraction_of_people_mask=1 %satuan persen

panjang = 9 %meter
lebar = 2.1 %meter
tinggi = 3 %meter
volume =  panjang*lebar*tinggi% satuan m3
duration_of_event = 720 %satuan jam
Durasi = 0:1:duration_of_event./60

jarak1 = 0.1
jarak2 = 0.65
jarak3 = 1.2
prob_social_distance_1 = (-18.19*log(jarak1)+43.276)/100 %rumus
(10). )Sun C. dan Zhai Z, 2020).
prob_social_distance_2 = (-18.19*log(jarak2)+43.276)/100 %rumus
(10). )Sun C. dan Zhai Z, 2020).
prob_social_distance_3 = (-18.19*log(jarak3)+43.276)/100 %rumus
(10). )Sun C. dan Zhai Z, 2020).
quanta_exhalation_rate = 3.1
quanta_exhalation_rate_new_1 =
quanta_exhalation_rate.*prob_social_distance_1
quanta_exhalation_rate_new_2 =
quanta_exhalation_rate.*prob_social_distance_2
quanta_exhalation_rate_new_3 =
quanta_exhalation_rate.*prob_social_distance_3

breathing_rate=0.54
inhalation_mask_efficiency = 0.3
number_of_repetition_event=1
prob_of_being_infective=0.007

jumlah_orang = 18
infective_people = 1
fraction_of_population_inmune = 0
```

```
susceptible_people= (jumlah_orang - infective_people)*(1-
fraction_of_population_inmune)

Total_first_order_loss_rate= ventilation_outside_air +
decay_rate_of_this_virus + deposition_to_surface +
additional_control_measures



Net_emission_rate_1 = quanta_exhalation_rate_new_1.*(1 -
exhalation_mask_efficiency.*fraction_of_people_mask).*infective_pe
ople
Net_emission_rate_2 = quanta_exhalation_rate_new_2.*(1 -
exhalation_mask_efficiency.*fraction_of_people_mask).*infective_pe
ople
Net_emission_rate_3 = quanta_exhalation_rate_new_3.*(1 -
exhalation_mask_efficiency.*fraction_of_people_mask).*infective_pe
ople

Avg_quanta_concentration_1 =
Net_emission_rate_1./Total_first_order_loss_rate./volume.*(1-
(1/Total_first_order_loss_rate./Durasi).*(1 - exp(-
Total_first_order_loss_rate.*Durasi)))
Avg_quanta_concentration_2 =
Net_emission_rate_2./Total_first_order_loss_rate./volume.*(1-
(1/Total_first_order_loss_rate./Durasi).*(1 - exp(-
Total_first_order_loss_rate.*Durasi)))
Avg_quanta_concentration_3 =
Net_emission_rate_3./Total_first_order_loss_rate./volume.*(1-
(1/Total_first_order_loss_rate./Durasi).*(1 - exp(-
Total_first_order_loss_rate.*Durasi)))

Quanta_inhale_per_person_1 =
Avg_quanta_concentration_1.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
Quanta_inhale_per_person_2 =
Avg_quanta_concentration_2.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
Quanta_inhale_per_person_3 =
Avg_quanta_concentration_3.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)

Infeksi_1a = 1-exp(-Quanta_inhale_per_person_1)
Infeksi_1b = 1-exp(-Quanta_inhale_per_person_2)
Infeksi_1c = 1-exp(-Quanta_inhale_per_person_3)

Infeksi_2a = 1 - (1 -
Infeksi_1a.*prob_of_being_infective).^susceptible_people
Infeksi_2b = 1 - (1 -
Infeksi_1b.*prob_of_being_infective).^susceptible_people
Infeksi_2c = 1 - (1 -
Infeksi_1c.*prob_of_being_infective).^susceptible_people

Infeksi_3a = 1 - (1 - Infeksi_2a).^ number_of_repetition_event
Infeksi_3b = 1 - (1 - Infeksi_2b).^ number_of_repetition_event
Infeksi_3c = 1 - (1 - Infeksi_2c).^ number_of_repetition_event
```

```
hasil1a=Infeksi_1a*100
hasil2a=Infeksi_2a*100
hasil3a=Infeksi_3a*100

hasil1b=Infeksi_1b*100
hasil2b=Infeksi_2b*100
hasil3b=Infeksi_3b*100

hasil1c=Infeksi_1c*100
hasil2c=Infeksi_2c*100
hasil3c=Infeksi_3c*100

plot(Durasi, hasil3a,'-*b', Durasi, hasil3b,'-*r', Durasi,
hasil3c,'-*g')
xlabel('Durasi (jam)')
ylabel('Risiko Terinfeksi(%)')
xlim([1 12])
ylim([0 0.5])
title({'Pengaruh Jarak terhadap Risiko Terinfeksi Aerosol SARS-
CoV-2'; 'di dalam Bus'})
legend('jarak = 0.1 meter', 'jarak = 0.65 meter','jarak = 1.2
meter')

%%
%ventilasi

T = 22
RH = 55%dalam persen, mini:20, med:50, max:70
UV = 0 %tanpa satuan, mini:0, med:2.5, max:4
decay_rate_of_this_virus=(7.569+1.411*((T-20.54)/10.66)+
0.022*((RH-45.235)/28.665)+...
                              7.553*(((UV*0.9)-50)/50)+1.397*((T-
20.54)/10.66)*(((UV*0.9)-50)/50))*60 %(Dabisch P. dkk., 2020)

ventilation_outside_air_1=2
ventilation_outside_air_2=4
ventilation_outside_air_3=6
deposition_to_surface=0.3
additional_control_measures=0

exhalation_mask_efficiency=0.4 %satuan persen
fraction_of_people_mask=1 %satuan persen

panjang = 9%meter
lebar = 2.1 %meter
tinggi = 3 %meter
volume =  panjang*lebar*tinggi% satuan m3
duration_of_event = 720 %satuan jam
Durasi = 0:1:duration_of_event./60

jarak = 0.65
prob_social_distance = (-18.19*log(jarak)+43.276)/100 %rumus (10).
)Sun C. dan Zhai Z, 2020).
```

```
quanta_exhalation_rate = 3.1
quanta_exhalation_rate_new =
quanta_exhalation_rate.*prob_social_distance

breathing_rate=0.54
inhalation_mask_efficiency = 0.3
number_of_repetition_event=1
prob_of_being_infective=0.007

jumlah_orang = 18
infective_people = 1
fraction_of_population_inmune = 0
susceptible_people= (jumlah_orang - infective_people)*(1-
fraction_of_population_inmune)

Total_first_order_loss_rate_1 = ventilation_outside_air_1 +
decay_rate_of_this_virus + deposition_to_surface +
additional_control_measures
Total_first_order_loss_rate_2 = ventilation_outside_air_2 +
decay_rate_of_this_virus + deposition_to_surface +
additional_control_measures
Total_first_order_loss_rate_3 = ventilation_outside_air_3 +
decay_rate_of_this_virus + deposition_to_surface +
additional_control_measures

Net_emission_rate = quanta_exhalation_rate_new.*(1 -
exhalation_mask_efficiency.*fraction_of_people_mask).*infective_pe
ople

Avg_quanta_concentration_1 =
Net_emission_rate./Total_first_order_loss_rate_1./volume.*(1-
(1/Total_first_order_loss_rate_1./Durasi).*(1 - exp(-
Total_first_order_loss_rate_1.*Durasi)))
Avg_quanta_concentration_2 =
Net_emission_rate./Total_first_order_loss_rate_2./volume.*(1-
(1/Total_first_order_loss_rate_2./Durasi).*(1 - exp(-
Total_first_order_loss_rate_2.*Durasi)))
Avg_quanta_concentration_3 =
Net_emission_rate./Total_first_order_loss_rate_3./volume.*(1-
(1/Total_first_order_loss_rate_3./Durasi).*(1 - exp(-
Total_first_order_loss_rate_3.*Durasi)))

Quanta_inhale_per_person_1 =
Avg_quanta_concentration_1.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
Quanta_inhale_per_person_2 =
Avg_quanta_concentration_2.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
Quanta_inhale_per_person_3 =
Avg_quanta_concentration_3.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)

Infeksi_1a = 1-exp(-Quanta_inhale_per_person_1)
Infeksi_1b = 1-exp(-Quanta_inhale_per_person_2)
Infeksi_1c = 1-exp(-Quanta_inhale_per_person_3)
```

```
Infeksi_2a = 1 - (1 -
Infeksi_1a.*prob_of_being_infective).^susceptible_people
Infeksi_2b = 1 - (1 -
Infeksi_1b.*prob_of_being_infective).^susceptible_people
Infeksi_2c = 1 - (1 -
Infeksi_1c.*prob_of_being_infective).^susceptible_people

Infeksi_3a = 1 - (1 - Infeksi_2a).^ number_of_repetition_event
Infeksi_3b = 1 - (1 - Infeksi_2b).^ number_of_repetition_event
Infeksi_3c = 1 - (1 - Infeksi_2c).^ number_of_repetition_event

hasil1a=Infeksi_1a*100
hasil2a=Infeksi_2a*100
hasil3a=Infeksi_3a*100

hasil1b=Infeksi_1b*100
hasil2b=Infeksi_2b*100
hasil3b=Infeksi_3b*100

hasil1c=Infeksi_1c*100
hasil2c=Infeksi_2c*100
hasil3c=Infeksi_3c*100

plot(Durasi, hasil3a,'-*b', Durasi, hasil3b,'-*r', Durasi,
hasil3c,'-*g')
xlabel('Durasi (jam)')
ylabel('Risiko Terinfeksi(%)')
xlim([1 12])
ylim([0 0.5])
title({'Pengaruh Ventilasi terhadap Risiko Terinfeksi Aerosol
SARS-CoV-2'; 'di dalam Bus'})
legend('Ventilasi = 2h-1', 'Ventilasi = 4h-1','Ventilasi = 6h-1')

%%
%masker exhalation

T  = 22
RH = 55%dalam persen, mini:20, med:50, max:70
UV = 0 %tanpa satuan, mini:0, med:2.5, max:4
decay_rate_of_this_virus=(7.569+1.411*((T-20.54)/10.66)+
0.022*((RH-45.235)/28.665)+...
                          7.553*(((UV*0.9)-50)/50)+1.397*((T-
20.54)/10.66)*(((UV*0.9)-50)/50))*60 %(Dabisch P. dkk., 2020)

ventilation_outside_air=4
deposition_to_surface=0.3
additional_control_measures=0

exhalation_mask_efficiency_1=0.1
exhalation_mask_efficiency_2=0.4
exhalation_mask_efficiency_3=0.95
fraction_of_people_mask=1
```

```
panjang = 9 %meter
lebar = 2.1 %meter
tinggi = 3 %meter
volume =  panjang*lebar*tinggi% satuan m3
duration_of_event = 720
Durasi = 0:1:duration_of_event./60

jarak = 0.65
prob_social_distance = (-18.19*log(jarak)+43.276)/100 %rumus (10).
)Sun C. dan Zhai Z, 2020).
quanta_exhalation_rate = 3.1
quanta_exhalation_rate_new =
quanta_exhalation_rate.*prob_social_distance

breathing_rate=0.54
inhalation_mask_efficiency = 0.3
number_of_repetition_event=1
prob_of_being_infective=0.007

jumlah_orang = 18
infective_people = 1
fraction_of_population_inmune = 0
susceptible_people= (jumlah_orang - infective_people)*(1-
fraction_of_population_inmune)

Total_first_order_loss_rate = ventilation_outside_air +
decay_rate_of_this_virus + deposition_to_surface +
additional_control_measures

Net_emission_rate_1 = quanta_exhalation_rate_new.*(1 -
exhalation_mask_efficiency_1.*fraction_of_people_mask).*infective_
people
Net_emission_rate_2 = quanta_exhalation_rate_new.*(1 -
exhalation_mask_efficiency_2.*fraction_of_people_mask).*infective_
people
Net_emission_rate_3 = quanta_exhalation_rate_new.*(1 -
exhalation_mask_efficiency_3.*fraction_of_people_mask).*infective_
people

Avg_quanta_concentration_1 =
Net_emission_rate_1./Total_first_order_loss_rate./volume.*(1-
(1/Total_first_order_loss_rate./Durasi).*(1 - exp(-
Total_first_order_loss_rate.*Durasi)))
Avg_quanta_concentration_2 =
Net_emission_rate_2./Total_first_order_loss_rate./volume.*(1-
(1/Total_first_order_loss_rate./Durasi).*(1 - exp(-
Total_first_order_loss_rate.*Durasi)))
Avg_quanta_concentration_3 =
Net_emission_rate_3./Total_first_order_loss_rate./volume.*(1-
(1/Total_first_order_loss_rate./Durasi).*(1 - exp(-
Total_first_order_loss_rate.*Durasi)))

Quanta_inhale_per_person_1 =
Avg_quanta_concentration_1.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
```

```
Quanta_inhale_per_person_2 =
Avg_quanta_concentration_2.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
Quanta_inhale_per_person_3 =
Avg_quanta_concentration_3.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)

Infeksi_1a = 1-exp(-Quanta_inhale_per_person_1)
Infeksi_1b = 1-exp(-Quanta_inhale_per_person_2)
Infeksi_1c = 1-exp(-Quanta_inhale_per_person_3)

Infeksi_2a = 1 - (1 -
Infeksi_1a.*prob_of_being_infective).^susceptible_people
Infeksi_2b = 1 - (1 -
Infeksi_1b.*prob_of_being_infective).^susceptible_people
Infeksi_2c = 1 - (1 -
Infeksi_1c.*prob_of_being_infective).^susceptible_people

Infeksi_3a = 1 - (1 - Infeksi_2a).^ number_of_repetition_event
Infeksi_3b = 1 - (1 - Infeksi_2b).^ number_of_repetition_event
Infeksi_3c = 1 - (1 - Infeksi_2c).^ number_of_repetition_event

hasil1a=Infeksi_1a*100
hasil2a=Infeksi_2a*100
hasil3a=Infeksi_3a*100

hasil1b=Infeksi_1b*100
hasil2b=Infeksi_2b*100
hasil3b=Infeksi_3b*100

hasil1c=Infeksi_1c*100
hasil2c=Infeksi_2c*100
hasil3c=Infeksi_3c*100

plot(Durasi, hasil3a,'-*b', Durasi, hasil3b,'-*r', Durasi,
hasil3c,'-*g')
xlabel('Durasi (jam)')
ylabel('Risiko Terinfeksi (%)')
xlim([1 12])
ylim([0 0.5])
title({'Pengaruh Exhalation Mask terhadap Risiko Terinfeksi
Aerosol SARS-CoV-2'; 'di dalam Bus'})
legend('Face Shield', 'Masker Bedah','Masker N95')

%%

%prevalensi

T  = 22
RH = 55%dalam persen, mini:20, med:50, max:70
UV = 0 %tanpa satuan, mini:0, med:2.5, max:4
decay_rate_of_this_virus=(7.569+1.411*((T-20.54)/10.66)+
0.022*((RH-45.235)/28.665)+...
```

```
                          7.553*(((UV*0.9)-50)/50)+1.397*((T-
20.54)/10.66)*(((UV*0.9)-50)/50))*60 %(Dabisch P. dkk., 2020)

ventilation_outside_air=4 % satuan h-1, min:2, med:4, max:6
deposition_to_surface=0.3
additional_control_measures=0

exhalation_mask_efficiency=0.4 %satuan persen
fraction_of_people_mask=1 %satuan persen

panjang = 9 %meter
lebar = 2.1 %meter
tinggi = 3 %meter
volume =  panjang*lebar*tinggi% satuan m3
duration_of_event = 720 %satuan jam
Durasi = 0:1:duration_of_event./60

jarak = 0.65
prob_social_distance = (-18.19*log(jarak)+43.276)/100 %rumus (10).
)Sun C. dan Zhai Z, 2020).
quanta_exhalation_rate = 3.1
quanta_exhalation_rate_new =
quanta_exhalation_rate.*prob_social_distance

breathing_rate=0.54
inhalation_mask_efficiency = 0.5
number_of_repetition_event=1
prob_of_being_infective_1=0.006
prob_of_being_infective_2=0.007
prob_of_being_infective_3=0.008

jumlah_orang = 18
infective_people = 1
fraction_of_population_inmune = 0
susceptible_people= (jumlah_orang - infective_people)*(1-
fraction_of_population_inmune)

Total_first_order_loss_rate_1 = ventilation_outside_air +
decay_rate_of_this_virus + deposition_to_surface +
additional_control_measures

Net_emission_rate = quanta_exhalation_rate_new.*(1 -
exhalation_mask_efficiency.*fraction_of_people_mask).*infective_pe
ople

Avg_quanta_concentration_1 =
Net_emission_rate./Total_first_order_loss_rate_1./volume.*(1-
(1/Total_first_order_loss_rate_1./Durasi).*(1 - exp(-
Total_first_order_loss_rate_1.*Durasi)))

Quanta_inhale_per_person_1 =
Avg_quanta_concentration_1.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency.*fraction_of_people_mask)
```

```
Infeksi_1 = 1-exp(-Quanta_inhale_per_person_1)


Infeksi_2a = 1 - (1 -
Infeksi_1.*prob_of_being_infective_1).^susceptible_people
Infeksi_2b = 1 - (1 -
Infeksi_1.*prob_of_being_infective_2).^susceptible_people
Infeksi_2c = 1 - (1 -
Infeksi_1.*prob_of_being_infective_3).^susceptible_people

Infeksi_3a = 1 - (1 - Infeksi_2a).^ number_of_repetition_event
Infeksi_3b = 1 - (1 - Infeksi_2b).^ number_of_repetition_event
Infeksi_3c = 1 - (1 - Infeksi_2c).^ number_of_repetition_event

hasil1=Infeksi_1*100

hasil2a=Infeksi_2a*100
hasil3a=Infeksi_3a*100

hasil2b=Infeksi_2b*100
hasil3b=Infeksi_3b*100

hasil2c=Infeksi_2c*100
hasil3c=Infeksi_3c*100

plot(Durasi, hasil3a,'-*b', Durasi, hasil3b,'-*r', Durasi,
hasil3c,'-*g')
xlabel('Durasi (jam)')
ylabel('Risiko Terinfeksi (%)')
xlim([1 12])
ylim([0 0.5])
title({'Pengaruh Prevalensi terhadap Risiko Terinfeksi Aerosol
SARS-CoV-2'; 'di dalam Bus'})
legend('Prevalensi = 0.6%', 'Prevalensi = 0.7%','Prevalensi =
0.8%')

%%
%masker inhalation

T  = 22
RH = 55%dalam persen, mini:20, med:50, max:70
UV = 0 %tanpa satuan, mini:0, med:2.5, max:4
decay_rate_of_this_virus=(7.569+1.411*((T-20.54)/10.66)+
0.022*((RH-45.235)/28.665)+...
                            7.553*(((UV*0.9)-50)/50)+1.397*((T-
20.54)/10.66)*(((UV*0.9)-50)/50))*60 %(Dabisch P. dkk., 2020)

ventilation_outside_air=4
deposition_to_surface=0.3
additional_control_measures=0

exhalation_mask_efficiency=0.4
fraction_of_people_mask=1
```

```
panjang = 9 %meter
lebar = 2.1 %meter
tinggi = 3 %meter
volume =  panjang*lebar*tinggi% satuan m3
duration_of_event = 720
Durasi = 0:1:duration_of_event./60

jarak = 0.65
prob_social_distance = (-18.19*log(jarak)+43.276)/100 %rumus (10).
)Sun C. dan Zhai Z, 2020).
quanta_exhalation_rate = 3.1
quanta_exhalation_rate_new =
quanta_exhalation_rate.*prob_social_distance

breathing_rate=0.54
inhalation_mask_efficiency_1 = 0.1
inhalation_mask_efficiency_2 = 0.3
inhalation_mask_efficiency_3 = 0.95
number_of_repetition_event=1
prob_of_being_infective=0.007

jumlah_orang = 18
infective_people = 1
fraction_of_population_inmune = 0
susceptible_people= (jumlah_orang - infective_people)*(1-
fraction_of_population_inmune)

Total_first_order_loss_rate = ventilation_outside_air +
decay_rate_of_this_virus + deposition_to_surface +
additional_control_measures

Net_emission_rate= quanta_exhalation_rate_new.*(1 -
exhalation_mask_efficiency.*fraction_of_people_mask).*infective_pe
ople

Avg_quanta_concentration =
Net_emission_rate./Total_first_order_loss_rate./volume.*(1-
(1/Total_first_order_loss_rate./Durasi).*(1 - exp(-
Total_first_order_loss_rate.*Durasi)))

Quanta_inhale_per_person_1 =
Avg_quanta_concentration.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency_1.*fraction_of_people_mask)
Quanta_inhale_per_person_2 =
Avg_quanta_concentration.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency_2.*fraction_of_people_mask)
Quanta_inhale_per_person_3 =
Avg_quanta_concentration.*breathing_rate.*Durasi.*(1 -
inhalation_mask_efficiency_3.*fraction_of_people_mask)

Infeksi_1a = 1-exp(-Quanta_inhale_per_person_1)
Infeksi_1b = 1-exp(-Quanta_inhale_per_person_2)
Infeksi_1c = 1-exp(-Quanta_inhale_per_person_3)
```

```
Infeksi_2a = 1 - (1 -
Infeksi_1a.*prob_of_being_infective).^susceptible_people
Infeksi_2b = 1 - (1 -
Infeksi_1b.*prob_of_being_infective).^susceptible_people
Infeksi_2c = 1 - (1 -
Infeksi_1c.*prob_of_being_infective).^susceptible_people

Infeksi_3a = 1 - (1 - Infeksi_2a).^ number_of_repetition_event
Infeksi_3b = 1 - (1 - Infeksi_2b).^ number_of_repetition_event
Infeksi_3c = 1 - (1 - Infeksi_2c).^ number_of_repetition_event

hasil1a=Infeksi_1a*100
hasil2a=Infeksi_2a*100
hasil3a=Infeksi_3a*100

hasil1b=Infeksi_1b*100
hasil2b=Infeksi_2b*100
hasil3b=Infeksi_3b*100

hasil1c=Infeksi_1c*100
hasil2c=Infeksi_2c*100
hasil3c=Infeksi_3c*100

plot(Durasi, hasil3a,'-*b', Durasi, hasil3b,'-*r', Durasi,
hasil3c,'-*g')
xlabel('Durasi (jam)')
ylabel('Risiko Terinfeksi (%)')
xlim([1 12])
ylim([0 0.5])
title({'Pengaruh Inhalation Mask terhadap Risiko Terinfeksi
Aerosol SARS-CoV-2'; 'di dalam Bus'})
legend('Face Shield', 'Masker Bedah','Masker N95')
```

```
%Lampiran 2. Script Simulasi Acak
%random generator

clear
clc
rng default
r = randi(3,1000,9) % acak utk 5 eksperimen, ada 8 input dan
masing-masing input salah satu dari 3 kategori
%1 = min, 2=rata-rata, 3=maks
%input kasus, ada 8 input: suhu (i1), kelembaban (i2),indeks UV
(i3),
%                          durasi (i4), jarak antara org (i5),
ventilasi (i6),
%                          exhalation mask (i7), prevalensi (i8),
%                          inhalatioan mask (i9)


[mm,nn]=size(r);
in1=r(:,1);in2=r(:,2);in3=r(:,3);in4=r(:,4);in5=r(:,5);in6=r(:,6);
in7=r(:,7);in8=r(:,8);in9=r(:,9);


%LOOP utk deklarasi semua input dgn 3 keadaan: min, ave dan max
for i=1:mm
    if in1(i)==1
        suhu(i)=18;
    else if in1(i)==2;
        suhu(i)=22;
        else
            suhu(i)=26;
        end
    end
end

for j=1:mm
    if in2(j)==1
        rh(j)=35;
    else if in2(j)==2
        rh(j)=55;
        else
            rh(j)=75;
        end
    end
end

for k=1:mm
    if in3(k)==1
        uv(k)=0;
    else if in3(k)==2;
        uv(k)=2.5;
        else
            uv(k)=3.5;
        end
    end
end
```

```
for l=1:mm
    if in4(l)==1
        durasi(l)=8;
    else if in4(l)==2;
        durasi(l)=10;
        else
            durasi(l)=12;
        end
    end
end

for m=1:mm
    if in5(m)==1
        jarak(m)=0.1;
    else if in5(m)==2;
        jarak(m)=0.65;
        else
            jarak(m)=1.2;
        end
    end
end

for n=1:mm
    if in6(n)==1
        ventilasi(n)=2;
    else if in6(n)==2;
        ventilasi(n)=4;
        else
            ventilasi(n)=6;
        end
    end
end

for o=1:mm
    if in7(o)==1
        maskerout(o)=0.1;
    else if in7(o)==2;
        maskerout(o)=0.4;
        else
            maskerout(o)=0.95;
        end
    end
end

for p=1:mm
    if in8(p)==1
        prevalensi(p)=0.006;
    else if in8(p)==2;
        prevalensi(p)=0.007;
        else
            prevalensi(p)=0.008;
        end
    end
end
```

```
for q=1:mm
    if in9(q)==1
        maskerin(q)=0.1;
    else if in9(q)==2;
        maskerin(q)=0.3;
        else
            maskerin(q)=0.95;
        end
    end
end


%exitt

T=suhu'
RH=rh'
UV=uv'
ventilation_outside_air=ventilasi'
decay_rate_of_this_virus=(7.569+1.411 .*((T-20.54)/10.66)+
0.022.*((RH-45.235)/28.665)+...
                          7.553.*(((UV.*0.9)-50)/50)+1.397.*((T-
20.54)/10.66).*(((UV.*0.9)-50)/50)).*60%(Dabisch P. dkk., 2020)
deposition_to_surface=0.3
additional_control_measures=0

exhalation_mask_efficiency= maskerout' %satuan persen
fraction_of_people_mask=1 %satuan persen
inhalation_mask_efficiency = maskerin'

panjang = 9; %satuan meter
lebar = 2.1;%satuan meter
tinggi = 3;%satuan meter
volume = panjang.*lebar.*tinggi;%satuan m3
Durasi = durasi'

quanta_exhalation_rate = 3.1
prob_social_distance= (-18.19*log(jarak')+43.276)/100 %rumus (10),
(Sun C. dan Zhai Z, 2020).
quanta_exhalation_rate_new=quanta_exhalation_rate.*prob_social_dis
tance

breathing_rate=0.54
number_of_repetition_event=1
prob_of_being_infective=prevalensi'

jumlah_orang = 18
infective_people = 1
fraction_of_population_inmune = 0
susceptible_people= (jumlah_orang - infective_people)*(1-
fraction_of_population_inmune)

Total_first_order_loss_rate = ventilation_outside_air +
decay_rate_of_this_virus + deposition_to_surface +
additional_control_measures %(Kurnitski J., 2020)
```

```
Net_emission_rate = quanta_exhalation_rate_new.*(1 -
exhalation_mask_efficiency.*fraction_of_people_mask).*infective_pe
ople

Avg_quanta_concentration =
Net_emission_rate./Total_first_order_loss_rate./volume.*...
        (1-(1./Total_first_order_loss_rate./Durasi).*(1 - exp(-
Total_first_order_loss_rate.*Durasi)))%(Kurnitski J., 2020)

Quanta_inhale_per_person =
Avg_quanta_concentration.*breathing_rate.*Durasi.*...
        (1 - inhalation_mask_efficiency.*fraction_of_people_mask)

Infeksi_1 = 1-exp(-Quanta_inhale_per_person) %(Kurnitski J., 2020)

Infeksi_2 = 1 - (1 - Infeksi_1.*prevalensi').^susceptible_people

Infeksi_3 = 1 - (1 - Infeksi_2).^ number_of_repetition_event

hasil1=Infeksi_1*100
hasil2=Infeksi_2*100
hasil3=Infeksi_3*100 % ini adalah hasil perhitungan resiko infeksi
krn sdh mengcakup infeksi 1 dan 2


%tampilan inputs dan output yg akan menjadi input program stepwise
%regression


hasil=[suhu' rh' uv' durasi' jarak' ventilasi' maskerout'
prevalensi' maskerin' hasil3]


save eks1000.txt hasil -ascii
```