
emodpy-tbhiv

Institute for Disease Modeling

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emodpy-tbhiv is a collection of Python scripts and utilities created to streamline user interactions with EMOD and idmtools for modeling measles. Much of the functionality is inherited from the `emod_api` and `emodpy` packages.

Additional information about how to use idmtools can be found at in [Welcome to idmtools](#). Additional information about EMOD TBHIV parameters for modeling tuberculosis can be found in [EMOD parameter reference](#).

See [Welcome to idmtools](#) for a diagram showing how idmtools and each of the related packages are used in an end-to-end workflow using EMOD as the disease transmission model.

**CHAPTER
ONE**

INSTALLATION

You can install emodpy-tbhiv using the instructions in the GitHub repository README.

EMODPY_TBHIV

2.1 emodpy_tbhiv package

The emodpy-tbhiv module is intended to house scripts and tools that enable disease modelers to work more easily with the IDM EMOD TBHIV model.

2.1.1 Subpackages

emodpy_tbhiv.demographics package

Submodules

emodpy_tbhiv.demographics.TBHIVDemographics module

```
class emodpy_tbhiv.demographics.TBHIVDemographics(pop,
                                                    nodes=None,
                                                    idref='Gridded'
                                                    world
                                                    grump2.5arcmin',
                                                    base_file=None)
```

Bases: emod_api.demographics.Demographics.Demographics

This class is derived from emod_api.demographics' Demographics class so that we can set certain defaults for TBHIV in construction. Keen observers will note that SetDefaultProperties does not look like a TBHIV-specific function. But as we add other disease types the generalizations and specifics will become clearer. The architectural point is solid.

SetHIVCoInfectionDistribution()

Insert some notion of a default HIVCoInfection distribution.

SetHIVTBCoInfectionMortalityDistribution()

Insert some notion of a default HIVTBCoInfection Mortality distribution.

```
emodpy_tbhiv.demographics.TBHIVDemographics.fromBasicNode(lat=0,          lon=0,
                                                               pop=1000000.0,
                                                               name=1,
                                                               forced_id=1,      im-
                                                               plicit_config_fns=None)
```

This function creates a single-node TBHIVDemographics instance from the params you give it.

emodpy_tbhiv

```
emodpy_tbhiv.demographics.TBHIVDemographics.fromData(pop=1000000.0, file-
name_male='Malawi_male_mortality.csv',
file-
name_female='Malawi_female_mortality.csv')
```

emodpy_tbhiv.interventions package

```
emodpy_tbhiv.interventions.purge_campaign_event(camp_event)
```

Submodules

emodpy_tbhiv.interventions.active_diagnostic module

```
emodpy_tbhiv.interventions.active_diagnostic.ActiveDiagnostic(camp, trigger_treatment_list,
ac-
tive_sensitivity=1.0,
ac-
tive_specificity=1.0,
pos_event='TBTestPositive',
treat-
ment_fraction=1,
start_day=0,
duration=-
1, prop-
erty_restrictions_list=[],
nodeIDs=[],
black_period=0,
black_trigger='Blackout',
event_name='TB
Diagnosis Active
Simple')
```

:param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

```
emodpy_tbhiv.interventions.active_diagnostic.new_intervention_as_file(camp,
start_day=1,
file-
name=None)
```

emodpy_tbhiv.interventions.art module

```
emodpy_tbhiv.interventions.art.ART(camp, trigger_treatment_list, start_day=0, duration=-
1, prop-
erty_restrictions_list=[], nodeIDs=[],
black_period=0, black_trigger='Blackout',
event_name='ART')
```

:param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

```
emodpy_tbhiv.interventions.art.new_intervention_as_file(camp, filename='art.json')
```

emodpy_tbhiv.interventions.bcg module

```
emodpy_tbhiv.interventions.bcg.BCG(camp, trigger_treatment_list, initial_efficacy=1.0, vaccine_take=1, age_take_decay=1.0, box_duration=365, immune_decay=3650, start_day=0, duration=- 1, property_restrictions_list=[], nodeIDs=[], black_period=0, black_trigger='Blackout', event_name='Vaccine Health Seeking')
```

BCG Vaccine :param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

```
emodpy_tbhiv.interventions.bcg.new_intervention_as_file(camp,filename=None)
```

emodpy_tbhiv.interventions.cd4diag module

```
emodpy_tbhiv.interventions.cd4diag.get_thresh(name, low, high, camp)
```

```
emodpy_tbhiv.interventions.cd4diag.get_threshes(group_names, camp)
```

```
emodpy_tbhiv.interventions.cd4diag.CD4Diag(camp, trigger_treatment_list, event_200='Below200', event_350='Below350', event_500='Below500', event_above_500='Above500', start_day=0, duration=- 1, property_restrictions_list=[], nodeIDs=[], black_period=0, black_trigger='Blackout', event_name='CD4 Diagnostic')
```

ART :param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

```
emodpy_tbhiv.interventions.cd4diag.new_intervention_as_file(camp, file-name='cd4.json')
```

emodpy_tbhiv.interventions.diag_treat_neg module

```
emodpy_tbhiv.interventions.diag_treat_neg.DiagnosticTreatNeg(camp, trigger_treatment_list, base_sensitivity_smearpos=1.0, base_sensitivity_smearneg=1.0, pos_event='TBTestPositive', neg_event='TBTestNegative', def_event='TBTestDefault', treatment_fraction=1, start_day=0, duration=- 1, property_restrictions_list=[], nodeIDs=[], black_period=0, black_trigger='Blackout', event_name='TB Diagnosis')
```

:param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

emodpy_tbhiv

```
emodpy_tbhiv.interventions.diag_treat_neg.new_intervention_as_file(camp, file-
name='dtn.json')
```

emodpy_tbhiv.interventions.hiv_diag module

```
emodpy_tbhiv.interventions.hiv_diag.HIVDiagnostic(camp, trigger_treatment_list,
                                                 base_sensitivity=1.0,
                                                 base_specificity=1.0,
                                                 pos_event='HIVTestedPositive',
                                                 neg_event='HIVTestedNegative',
                                                 treatment_fraction=1,
                                                 start_day=0, duration=- 1,
                                                 property_restrictions_list=[],
                                                 nodeIDs=[], black_period=0,
                                                 black_trigger='Blackout',
                                                 event_name='HIV Diagnostic')
```

:param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

```
emodpy_tbhiv.interventions.hiv_diag.new_intervention_as_file(camp, file-
name=None)
```

emodpy_tbhiv.interventions.hiv_seeding module

```
emodpy_tbhiv.interventions.hiv_seeding.HIV(camp, time_offset=0, disease='HIV', reps=-
1, interval=1, start_day=0, nodeIDs=[], event_name='HIV Incidence')
```

```
emodpy_tbhiv.interventions.hiv_seeding.new_intervention_as_file(camp, file-
name='hiv.json')
```

emodpy_tbhiv.interventions.hsb module

```
emodpy_tbhiv.interventions.hsb.HSB(camp, trigger_treatment_list, output_event, probability_per_step=1.0, start_day=0, duration=- 1, property_restrictions_list=[], nodeIDs=[], black_period=0, black_trigger='Blackout', event_name='HSB')
```

:param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

```
emodpy_tbhiv.interventions.hsb.new_intervention_as_file(camp, file-
name='hsb_diag.json')
```

emodpy_tbhiv.interventions.ramp_dtn module

```
emodpy_tbhiv.interventions.ramp_dtn.RampDTN(camp, trigger_treatment_list,
                                              ramp_time=30,
                                              base_sensitivity_smearpos=1.0,
                                              base_sensitivity_smearneg=1.0,
                                              base_sensitivity_smearpos2=1.0,
                                              base_sensitivity_smearneg2=1.0,
                                              treatment_fraction=1.0,
                                              treatment_fraction2=1.0,
                                              pos_event='TBTestPositive',
                                              neg_event='TBTestNegative', de-
                                              faulters_event='TBTestDefault',
                                              pos_event2='TBTestPositive',
                                              neg_event2='TBTestNegative', de-
                                              faulters_event2='TBTestDefault',
                                              start_day=0, duration=- 1, prop-
                                              erty_restrictions_list=[], nodeIDs=[],
                                              black_period=0, black_trigger='Blackout',
                                              event_name='RampDTN')

:param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

emodpy_tbhiv.interventions.ramp_dtn.new_intervention_as_file(camp, file-
                                                               name='ramp.json')
```

emodpy_tbhiv.interventions.resist_diag module

```
emodpy_tbhiv.interventions.resist_diag.ResistanceDiagnostic(camp, trigger_treatment_list,
                                                               sensitivity=1.0,
                                                               specificity=1.0,
                                                               pos_event='TBMDRTTestPositive',
                                                               neg_event='TBMDRTTestNegative',
                                                               def_event='TBMDRTTestDefault',
                                                               treat-
                                                               ment_fraction=1,
                                                               treat-
                                                               ment_fraction_negative_test=1,
                                                               start_day=0,
                                                               duration=- 1, prop-
                                                               erty_restrictions_list=[], nodeIDs=[],
                                                               black_period=0,
                                                               black_trigger='Blackout',
                                                               event_name='TB Di-
                                                               agnosis MDR')

:param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

emodpy_tbhiv.interventions.resist_diag.new_intervention_as_file(camp, file-
                                                               name='resist_diag.json')
```

emodpy_tbhiv.interventions.smear_diag module

```
emodpy_tbhiv.interventions.smear_diag.SmearDiagnostic(camp, trigger_treatment_list,
                                                       base_sensitivity_smearpos=1.0,
                                                       base_sensitivity_smearneg=1.0,
                                                       pos_event='TestPositiveOnSmear',
                                                       treatment_fraction=1,
                                                       start_day=0, duration=- 1,
                                                       property_restrictions_list=[],
                                                       nodeIDs=[], black_period=0,
                                                       black_trigger='Blackout',
                                                       event_name='TB Diagnosis
                                                       Smear Simple')

:param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

emodpy_tbhiv.interventions.smear_diag.new_intervention_as_file(camp,      file-
                                                               name='smear_diag.json')
```

emodpy_tbhiv.interventions.tb_treat_basic module

```
emodpy_tbhiv.interventions.tb_treat_basic.TBDrugTreatment(camp,          trig-
                                                               ger_treatment_list,
                                                               drug_name='DOTS',
                                                               inactivation_rate=0,
                                                               mortality_rate=0,
                                                               clearance_rate=0,
                                                               resistance_rate=0,
                                                               relapse_rate=0,     re-
                                                               duced_transmit=1.0,
                                                               start_day=0,       treat-
                                                               ment_duration=180,
                                                               duration=- 1,    prop-
                                                               erty_restrictions_list=[],
                                                               nodeIDs=[],        black_
                                                               period=0,
                                                               black_trigger='Blackout',
                                                               event_name='TBDrugTreatment')

:param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

emodpy_tbhiv.interventions.tb_treat_basic.new_intervention_as_file(camp, file-
                                                               name=None)
```

emodpy_tbhiv.interventions.tbhiv_treat module

```
emodpy_tbhiv.interventions.tbhiv_treat.TBHIVDrugTreatment(camp, trigger_treatment_list,
                                                               drug_name, latent_multiplier=1.0,
                                                               active_multiplier=1.0,
                                                               start_day=0,
                                                               duration=- 1, property_restrictions_list=[],
                                                               nodeIDs=[], black_period=0,
                                                               black_trigger='Blackout',
                                                               event_name='TBHIVDrugTreatment')

:param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

emodpy_tbhiv.interventions.tbhiv_treat.new_intervention_as_file(camp, file-
                                                               name='tb_drug_treat.json')
```

emodpy_tbhiv.interventions.triggered_pvc module

```
emodpy_tbhiv.interventions.triggered_pvc.TPVC(camp, trigger_treatment_list, property_to_change, final_prop_value,
                                                 revert=0, daily_prob=1,
                                                 start_day=0, duration=- 1,
                                                 property_restrictions_list=[],
                                                 nodeIDs=[], black_period=0,
                                                 black_trigger='Blackout',
                                                 event_name='PropertyValueChanger')

Triggered Property Value Changer :param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

emodpy_tbhiv.interventions.triggered_pvc.new_intervention_as_file(camp, file-
                                                               name='tpvc.json')
```

emodpy_tbhiv.interventions.vaccine module

```
emodpy_tbhiv.interventions.vaccine.Vaccine(camp, trigger_treatment_list, initial_efficacy=1.0, vaccine_take=1,
                                                vtype='AcquisitionBlocking',
                                                box_duration=365, immune_decay=3650,
                                                start_day=0, duration=- 1, property_restrictions_list=[],
                                                nodeIDs=[], black_period=0, black_trigger='Blackout',
                                                event_name='Vaccine')

:param TBD Note start_day is initialized as 1, recommend that this be aligned with the start of the simulation

emodpy_tbhiv.interventions.vaccine.new_intervention_as_file(camp, file-
                                                               name='vaccine.json')
```

emodpy_tbhiv.reporters package

Submodules

emodpy_tbhiv.reporters.plugin module

```
class emodpy_tbhiv.reporters.plugin.Report_TBHIV_ByAge(name: str = 'Report_TBHIV_ByAge',
                                                       Enabled: bool = True,
                                                       Reports: list = <factory>,
                                                       dll_file: str = 'libreport_TBHIV_ByAge.dll')

Bases: emodpy.reporters.base.CustomReporter

name: str = 'Report_TBHIV_ByAge'
dll_file: str = 'libreport_TBHIV_ByAge.dll'
configure_report(max_age_yrs, min_age_yrs, start_year, stop_year, events=None)
```

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