
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](#) package and [emodpy](#) package.

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.

EMODPY-TBHIV INSTALLATION

Follow the steps below to install emodpy-tbhiv.

1.1 Prerequisites

First, ensure the following prerequisites are met.

- Windows 10 Pro or Enterprise, Linux, or Mac
- Python 3.9 64-bit (<https://www.python.org/downloads/release>)
- A file that indicates the pip index-url:
 - Windows
 - Linux

In C:\Users\Username\pip\pip.ini, containing the following:

```
[global]
index-url = https://packages.idmod.org/api/pypi/pypi-production/simple
```

In \$HOME/.config/pip/pip.conf, containing the following:

```
[global]
index-url = https://packages.idmod.org/api/pypi/pypi-production/simple
```

1.2 Installation instructions

1. Open a command prompt and create a virtual environment in any directory you choose. The command below names the environment “v-emodpy-tbhiv”, but you may use any desired name:

```
python -m venv v-emodpy-tbhiv
```

2. Activate the virtual environment:

- Windows
- Linux

Enter the following:

```
v-emodpy-tbhiv\Scripts\activate
```

Enter the following:

```
source v-emodpy-tbhiv/bin/activate
```

3. Install emodpy-tbhiv packages:

```
pip install emodpy-tbhiv
```

If you are on Linux, also run:

```
pip install keyrings.alt
```

4. When you are finished, deactivate the virtual environment by entering the following at a command prompt:

```
deactivate
```


API REFERENCE

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=None,  
                                                    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.demographics.TBHIVDemographics.from_template_node(lat=0, lon=0,
                                                                pop=1000000.0,
                                                                name=1,
                                                                forced_id=1)
```

Create a single-node *TBHIVDemographics* instance from the parameters you supply.

Parameters

- **lat** – Latitude of the centroid of the node to create.
- **lon** – Longitude of the centroid of the node to create.
- **pop** – Human population of the node.
- **name** – The name of the node. This may be a characteristic of the node, such as “rural” or “urban”, or an identifying integer.
- **forced_id** – The node ID for the single node.

Returns A *TBHIVDemographics* instance.

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

```
emodpy_tbhiv.demographics.TBHIVDemographics.from_csv(pop_file,
                                                         res=0.008333333333333333,
                                                         id_ref='from_csv', file-
                                                         name_male='Malawi_male_mortality.csv',
                                                         file-
                                                         name_female='Malawi_female_mortality.csv')
```

Create a multi-node *TBHIVDemographics* instance from a CSV file describing a population.

Parameters

- **pop_file** – The path to the csv file to ingest.
- **res** – Resolution.
- **id_ref** – A string to identify the file, needs to match other input files.
- **filename_male** – Path to male mortality csv.
- **filename_female** – Path to female mortality csv.

Returns A *TBHIVDemographics* instance

```
emodpy_tbhiv.demographics.TBHIVDemographics.from_params(tot_pop=1000000.0,
                                                         num_nodes=100,
                                                         frac_rural=0.3,
                                                         id_ref='from_params', file-
                                                         name_male='Malawi_male_mortality.csv',
                                                         file-
                                                         name_female='Malawi_female_mortality.csv')
```

Create a multi-node *TBHIVDemographics* instance as a synthetic population based on a few parameters.

Parameters

- **tot_pop** – The total human population in the node.
- **num_nodes** – The number of nodes to create.
- **frac_rural** – The fraction of the population that is rural.

- **id_ref** – Method describing how the latitude and longitude values are created for each of the nodes in a simulation. “Gridded world” values use a grid overlaid across the globe at some arcsec resolution. You may also generate the grid using another tool or coordinate system. For more information, see [Metadata](#).
- **filename_male** – Path to male mortality csv.
- **filename_female** – Path to female mortality csv.

Returns A *TBHIVDemographics* instance.

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*, *active_sensitivity*=1.0, *active_specificity*=1.0, *pos_event*='TBTestPositive', *treatment_fraction*=1, *start_day*=0, *duration*=-1, *property_restrictions_list*=[], *nodeIDs*=[], *black_period*=0, *black_trigger*='Blackout', *event_name*='TB Diagnosis Active Simple')

Create and return triggered campaign event that issues an ActiveDiagnostic intervention. See [ActiveDiagnostic](#)

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **active_sensitivity** – Sensitivity. Defaults to 1.0.
- **active_specificity** – Specificity. Defaults to 1.0.
- **pos_event** – Signal (or trigger) which is broadcast if the test is positive. Defaults to 'TBTestPositive',
- **treatment_fraction** – Fraction of population testing positive you get the positive result effect.

- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

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

emodpy_tbhiv.interventions.age_targeted_vaccine module

```
emodpy_tbhiv.interventions.age_targeted_vaccine.AgeTargetedVaccine(camp,  
                                                                      trig-  
                                                                      ger_treatment_list,  
                                                                      ini-  
                                                                      tial_efficacy=1.0,  
                                                                      vac-  
                                                                      cine_take=1,  
                                                                      vtype='AcquisitionBlocking',  
                                                                      age_min_yrs=0,  
                                                                      age_max_yrs=125,  
                                                                      box_duration=365,  
                                                                      im-  
                                                                      mune_decay=10,  
                                                                      start_day=0,  
                                                                      duration=-  
                                                                      1, prop-  
                                                                      erty_restrictions_list=[],  
                                                                      nodeIDs=[],  
                                                                      black_period=0,  
                                                                      black_trigger='Blackout',  
                                                                      event_name='Vaccine')
```

Create and return triggered campaign event that issues a (generalized) Vaccine intervention. See [SimpleVaccine](#)

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **initial_efficacy** – Initial efficacy of the vaccine. Defaults to 1.0.
- **vaccine_take** – Fraction of the population receiving the vaccine for whom it is efficacious. Defaults to 1.0.

- **vtype** – ... Defaults to “AcquisitionBlogging”.
- **age_min_yrs** – Lower age bound, in years.
- **= 125** (*age_max_yrs*) – Upper age bound, in years.
- **box_duration** – Period of time over which the initial efficacy persists before decay. Defaults to 1 year.
- **immune_decay** – Period of time over which the efficacy decays to 0. Defaults to 10 years.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

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

emodpy_tbhiv.interventions.art module

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

Create and return triggered campaign event that issues an ART intervention.

Parameters

- **camp** – Centralized campaign module instance.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

```
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, vac-  
cine_take=1, age_take_decay=1.0, box_duration=365,  
immune_decay=3650, start_day=0, duration=- 1, prop-  
erty_restrictions_list=[], nodeIDs=[], black_period=0,  
black_trigger='Blackout', event_name='Vaccine Health  
Seeking')
```

Create and return triggered campaign event that issues an BCG vaccine intervention.

Parameters

- **camp** – Centralized campaign module instance.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **initial_efficacy** – Initial efficacy of the vaccine. Defaults to 1.0.
- **vaccine_take** – Fraction of the population receiving the vaccine for whom it is efficacious. Defaults to 1.0.
- **age_take_decay** – ... Defaults to 1.0.
- **box_duration** – Period of time over which the initial efficacy persists before decay. Defaults to 1 year.
- **immune_decay** – Period of time over which the efficacy decays to 0. Defaults to 10 years.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

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

emodpy_tbhiv.interventions.cd4diag module

```
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')
```

Create and return triggered campaign event that issues an CD4Diagnostic intervention.

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **event_200** – ...
- **event_350** – ...
- **event_500** – ...
- **event_above_500** – ...
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

```
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_smeapos=1.0,
    base_sensitivity_smeaneg=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')
```

Create and return triggered campaign event that issues an `DiagnosticTreatNeg` intervention. See [DiagnosticTreatNeg](#)

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.

- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **base_sensitivity_smeapos** – Sensitivity. Defaults to 1.0.
- **base_sensitivity_smeaneg** – Specificity. Defaults to 1.0.
- **pos_event** – Signal (or trigger) which is broadcast if the test is positive. Defaults to 'TBTestPositive',
- **neg_event** – Defaults to 'TBTestNegative'.
- **def_event** – Defaults to 'TBTestDefault'.
- **treatment_fraction** – Fraction of population testing positive you get the positive result effect.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

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

emodpy_tbhiv.interventions.drugs module

```
emodpy_tbhiv.interventions.drugs.add_tb_drug_type(config, drug_name, duration,  
                                                    cure_proportion, death_proportion,  
                                                    resistance_proportion, in-  
                                                    activation_proportion, re-  
                                                    lapse_proportion, re-  
                                                    duced_transmit=1, re-  
                                                    duced_acquire=1,  
                                                    cure_proportion_hiv=None,  
                                                    death_proportion_hiv=None,  
                                                    resistance_proportion_hiv=None,  
                                                    relapse_proportion_hiv=None,  
                                                    inactivation_proportion_hiv=None,  
                                                    mdr_cure_proportion=None,  
                                                    mdr_death_proportion=None,  
                                                    mdr_inactivation_proportion=None,  
                                                    mdr_relapse_proportion=None)
```

Add a drug definition to the simulation. This doesn't deliver the drug to anyone, and also doesn't mean we're going to use it. It's like putting it in the reference section.

```
emodpy_tbhiv.interventions.drugs.add_tb_drug(config, drug_name)
```

Tell the simulation which drugs we're going to use. Optionally override parameters in the process.

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')
```

Create and return triggered campaign event that issues an HIVSimpleDiagnostic intervention. See [HIVSimpleDiagnostic](#)

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **base_sensitivity** – Sensitivity. Defaults to 1.0.
- **base_specificity** – Specificity. Defaults to 1.0.
- **pos_event** – Signal (or trigger) which is broadcast if the test is positive. Defaults to 'HIVTestedPositive'.
- **neg_event** – Signal (or trigger) which is broadcast if the test is negative. Defaults to 'HIVTestedNegative'.
- **treatment_fraction** – Fraction of population testing positive you get the positive result effect.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

```
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')
```

Create a scheduled campaign event that issues an OutbreakIndividualTBorHIV intervention. Useful for seeding interventions in TBHIV_SIM.

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **time_offset** – ... Defaults to 0.
- **disease** – “TB” or “HIV”. Default is “HIV”.
- **reps** – Number of repetitions (integer). Defaults to no repetition.
- **interval** – Timesteps between repetitions, if reps is set. Defaults to every day.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

```
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')
```

Create and return triggered campaign event that issues an SimpleHealthSeekingBehavior intervention. See [SimpleHealthSeekingBehavior](#)

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **output_event** – Signal to broadcast when ‘health’ is ultimately sought (string).
- **probability_per_step** – Probability of seeking per timestep, default to 1 which means near instantaneous.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.

- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

```
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_smeapos=1.0,
                                              base_sensitivity_smeareg=1.0,
                                              base_sensitivity_smeapos2=1.0,
                                              base_sensitivity_smeareg2=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')
```

Create and return triggered campaign event that (TBD).

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **active_sensitivity** – Sensitivity. Defaults to 1.0.
- **active_specificity** – Specificity. Defaults to 1.0.
- **pos_event** – Signal (or trigger) which is broadcast if the test is positive. Defaults to 'TBTestPositive',
- **treatment_fraction** – Fraction of population testing positive you get the positive result effect.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.

- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

```
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='TBMDRTestPositive',  
                                                             neg_event='TBMDRTestNegative',  
                                                             def_event='TBMDRTestDefault',  
                                                             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')
```

Create and return triggered campaign event that issues an ResistanceDiagnostic intervention.

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **sensitivity** – Sensitivity. Defaults to 1.0.
- **specificity** – Specificity. Defaults to 1.0.
- **pos_event** – Signal (or trigger) which is broadcast if the test is positive. Defaults to 'TBMDRTestPositive'.
- **neg_event** – Signal (or trigger) which is broadcast if the test is negative. Defaults to 'TBMDRTestNegative'.
- **def_event** – Signal (or trigger) which is broadcast if the test is default. Defaults to 'TBMDRTestDefault'.

- **treatment_fraction** – Fraction of population testing positive you get the positive result effect. Defaults to 1.
- **treatment_fraction_negative_test** – ... Defaults to 1.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

```
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')
```

Create and return triggered campaign event that issues an SmearDiagnostic intervention.

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **base_sensitivity_smearpos** – Sensitivity. Defaults to 1.0.
- **base_sensitivity_smearneg** – Specificity. Defaults to 1.0.
- **pos_event** – Signal (or trigger) which is broadcast if the test is positive. Defaults to 'TBTestPositiveOnSmear'.
- **treatment_fraction** – Fraction of population testing positive you get the positive result effect.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.

- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

```
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, trigger_treatment_list,  
                                                           drug_name='DOTS',  
                                                           inactivation_rate=0,  
                                                           mortality_rate=0,  
                                                           clearance_rate=0,  
                                                           resistance_rate=0,  
                                                           relapse_rate=0, reduced_transmit=1.0,  
                                                           start_day=0, treatment_duration=180,  
                                                           duration=-1, property_restrictions_list=[],  
                                                           nodeIDs=[],  
                                                           black_period=0,  
                                                           black_trigger='Blackout',  
                                                           event_name='TBDrugTreatment')
```

Create and return triggered campaign event that issues an AntiTBDrug intervention. See [AntiTBDrug](#)

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **drug_name** – ... Defaults to 'DOTS',
- **inactivation_rate** – ... Defaults to 0,
- **mortality_rate** – ... Defaults to 0,
- **clearance_rate** – ... Defaults to 0,
- **resistance_rate** – ... Defaults to 0,
- **relapse_rate** – ... Defaults to 0,
- **reduced_transmit** – ... Defaults to 1.0,
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.

- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optiona list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

`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'*)

Create and return triggered campaign event that issues a ‘TBHIVConfigurableTBdrug’ intervention. See [TBHIVConfigurableTBdrug](#)

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **drug_name** – ...
- **latent_multiplier** – ... Defaults to 1.0.
- **active_multiplier** – ... Defaults to 1.0.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optiona list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

```
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, prop-  
                                                erty_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')
```

Create and return triggered campaign event that issues an PropertyValueChanger intervention. See [PropertyValueChanger](#)

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **property_to_change** – Individual Property key (string).
- **final_prop_value** – New Individual Property value (string).
- **revert** – ... Defaults to 0.
- **daily_prob** – Daily probability of changing. Defaults to 1.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

```
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')
```

Create and return triggered campaign event that issues a (generalized) Vaccine intervention. See [SimpleVaccine](#)

Parameters

- **camp** – The `emod_api.campaign` module instance which serves as the campaign accumulator.
- **trigger_treatment_list** – List of 1 or more triggers (or events or signals) which are listened to and trigger the distribution of the intervention. There is no default.
- **initial_efficacy** – Initial efficacy of the vaccine. Defaults to 1.0.
- **vaccine_take** – Fraction of the population receiving the vaccine for whom it is efficacious. Defaults to 1.0.
- **vtype** – ... Defaults to “AcquisitionBlogging”
- **box_duration** – Period of time over which the initial efficacy persists before decay. Defaults to 1 year.
- **immune_decay** – Period of time over which the efficacy decays to 0. Defaults to 10 years.
- **start_day** – The timestep when this campaign event takes effect. Defaults to 1.
- **duration** – How long the campaign event remains in effect. Defaults to forever.
- **property_restrictions_list** – Optional list of Individual Properties to limit the intervention to.
- **nodeIDs** – Optional list of node ids to target. Defaults to all.
- **black_period** – Undocumented.
- **black_trigger** – Undocumented.
- **event_name** – Undocumented.

Returns New campaign event that can be added to the campaign.

```
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 (camp, max_age_yrs, min_age_yrs, start_year, stop_year, events=None)
```

2.1.2 Submodules

emodpy_tbhiv.standard_drugs module

```
emodpy_tbhiv.standard_drugs.bootstrap (config)
```

FREQUENTLY ASKED QUESTIONS

As you get started with `emodpy-tbhiv`, you may have questions. The most common questions will be added below. For questions related to functionality in related packages, see the following documentation:

- [Frequently asked questions](#) for EMOD
- [Frequently asked questions](#) for `idmtools`
- [Frequently asked questions](#) for `emod-api`
- [Frequently asked questions](#) for `emodpy`

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