QMRA Streamlit Tool Development Log

Date: 2025-06-23

SUMMARY OF TODAY'S DEVELOPMENT SESSION

1. Streamlit App Enhancements:

- Added full input structure: water source, activities, pathogens, treatment train, and population settings.

- Cleaned up sidebar UI with defaults and structured layout.

- Ensured inputs map directly to the simulate_mc() model structure.

2. DALY Computation and Visualization:

- Simulated DALY using simulate_mc for each selected activity and pathogen.

- Aggregated results into combined_df and total_daly.

- Added log-scaled histogram with shaded WHO risk zone and percentile lines.

- Diagnosed and fixed issue with multi-peaked histogram (due to multimodal distribution).

3. AI Summary Integration (ChatGPT):

- Integrated GPT-4o using openai>=1.0.0 client (OpenAI v1 interface).

- Generated natural-language summary at the end of simulation (no button rerun needed).

- Used scenario inputs and DALY statistics to form prompt.

4. Report Export:

- Implemented DOCX report export using python-docx.

- Included scenario summary, AI interpretation, and plots (DALY histogram, pathogen bar chart).

5. Pathogen-specific KDE Plot:

- Computed per-pathogen DALY matrix using pivot_table.

- Added Seaborn-based KDE plot with log-scaled x-axis to visualize contribution distributions.

- Diagnosed and visualized sources of multimodal DALY output.

FUTURE DEVELOPMENT SUGGESTIONS

1. Scenario Comparison:

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- Allow side-by-side simulation and plotting of multiple treatment trains or sources.

- Add tabs or charts for "Scenario A vs B".

2. Save/Load Scenarios:

- Enable saving and loading of parameter sets (as JSON or YAML).

- Useful for recurring consultant projects.

3. Add Risk Modifiers:

- Implement ?children only?, immunocompromised, behavioral reduction modifiers to adjust dose/frequency.

4. PDF Export Option:

- Offer styled PDF report (in addition to DOCX) using fpdf or WeasyPrint.

5. Web Deployment:

- Deploy on Streamlit Cloud or Hugging Face Spaces with password-protected access.

6. Calibration/Validation Interface:

- Let users upload observed data or validation points.

- Visualize model vs observed outcomes.

7. Localization:

- Multi-language support (English/Swedish toggle).