References

HIV.gov. U.S. Statistics. https://www.hiv.gov/hiv-basics/overview/data-and-trend/statistics, 2023a. (accessed: 06.10.2023).

HIV.gov. Viral Suppression and an Undetectable Viral load. https://www.hiv.gov/hiv-basics/staying-in-hiv-care/hiv-treatment/viral-suppression#:~:text=Viral%20suppression%20is%20defined%20as,having%20\an%20undetectable%20viral%20load., 2023b. (accessed: 08.25.2023).

HIV.gov. Pre-Exposure Prophylaxis. https://www.hiv.gov/hiv-basics/hiv-prevention/using-hiv-medication-to-reduce-risk/pre-exposure-prophylaxis, 2023c. (accessed: 08.25.2023).

HIV.gov. Priority Jurisdictions: Phase I. https://www.hiv.gov/federal-response/ending-the-hiv-epidemic/jurisdictions, 2020. (accessed: 06.10.2022).

AHEAD. EHE Goal. https://www.ahead.hiv.gov/faqs, 2022a. (accessed: 08.25.2022).

Bohdan Nosyk, Xiao Zang, Emanuel Krebs, Benjamin Enns, Jeong E Min, Czarina N Behrends, Carlos Del Rio, Julia C Dombrowski, Daniel J Feaster, Matthew Golden, et al. Ending the hiv epidemic in the usa: an economic modelling study in six cities. *The Lancet HIV*, 7(7):e491–e503, 2020a.

Emanuel Krebs, Benjamin Enns, Linwei Wang, Xiao Zang, Dimitra Panagiotoglou, Carlos Del Rio, Julia Dombrowski, Daniel J Feaster, Matthew Golden, Reuben Granich, et al. Developing a dynamic hiv transmission model for 6 us cities: an evidence synthesis. *PloS one*, 14(5):e0217559, 2019.

Xiao Zang, Emanuel Krebs, Jeong E Min, Ankur Pandya, Brandon DL Marshall, Bruce R Schackman, Czarina N Behrends, Daniel J Feaster, and Bohdan Nosyk. Development and calibration of a dynamic hiv transmission model for 6 us cities. *Medical Decision Making*, 40(1):3–16, 2020.

Bohdan Nosyk, Xiao Zang, Emanuel Krebs, Jeong Eun Min, Czarina N Behrends, Carlos Del Rio, Julia C Dombrowski, Daniel J Feaster, Matthew Golden, Brandon DL Marshall, et al. Ending the epidemic in america will not happen if the status quo continues: modeled projections for human immunodeficiency virus incidence in 6 us cities. *Clinical Infectious Diseases*, 69(12):2195–2198, 2019.

Emanuel Krebs, Xiao Zang, Benjamin Enns, Jeong E Min, Czarina N Behrends, Carlos Del Rio, Julia C Dombrowski, Daniel J Feaster, Kelly A Gebo, Brandon DL Marshall, et al. Ending the hiv epidemic among persons who inject drugs: a cost-effectiveness analysis in six us cities. *The Journal of infectious diseases*, 222(Supplement_5):S301–S311, 2020.

Bohdan Nosyk, Emanuel Krebs, Xiao Zang, Micah Piske, Benjamin Enns, Jeong E Min, Czarina N Behrends, Carlos Del Rio, Daniel J Feaster, Matthew Golden, et al. "ending the epidemic" will not happen without addressing racial/ethnic disparities in the united states human immunodeficiency virus epidemic. *Clinical Infectious Diseases*, 71(11):2968–2971, 2020b.

Anthony Todd Fojo, Melissa Schnure, Parastu Kasaie, David W Dowdy, and Maunank Shah. What will it take to end hiv in the united states? a comprehensive, local-level modeling study. *Annals of internal medicine*, 174(11): 1542–1553, 2021.

Margo M Wheatley, Gregory Knowlton, Szu-Yu Kao, Samuel M Jenness, and Eva A Enns. Cost-effectiveness of interventions to improve hiv pre-exposure prophylaxis initiation, adherence, and persistence among men who have sex with men. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 90(1):41–49, 2022.

Seyedeh N Khatami and Chaitra Gopalappa. A reinforcement learning model to inform optimal decision paths for hiv elimination. *Mathematical biosciences and engineering: MBE*, 18(6):7666, 2021.

Nidhi Khurana, Emine Yaylali, Paul G Farnham, Katherine A Hicks, Benjamin T Allaire, Evin Jacobson, and Stephanie L Sansom. Impact of improved hiv care and treatment on prep effectiveness in the united states, 2016–2020. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 78(4):399–405, 2018.

Hanisha Tatapudi and Chaitra Gopalappa. Evaluating the sensitivity of jurisdictional heterogeneity and jurisdictional mixing in national level hiv prevention analyses: context of the us ending the hiv epidemic plan. *BMC Medical Research Methodology*, 22(1):1–20, 2022.

Sarah Kok, Alexander R Rutherford, Reka Gustafson, Rolando Barrios, Julio SG Montaner, Krisztina Vasarhelyi, and Vancouver HIV Testing Program Modelling Group. Optimizing an hiv testing program using a system dynamics model of the continuum of care. *Health care management science*, 18:334–362, 2015.

Kazeem Oare Okosun, OD Makinde, and I Takaidza. Impact of optimal control on the treatment of hiv/aids and screening of unaware infectives. *Applied mathematical modelling*, 37(6):3802–3820, 2013.

Chaitra Gopalappa, Paul G Farnham, Angela B Hutchinson, and Stephanie L Sansom. Cost effectiveness of the national hiv/aids strategy goal of increasing linkage to care for hiv-infected persons. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 61(1):99–105, 2012.

Feng Lin, Paul G Farnham, Ram K Shrestha, Jonathan Mermin, and Stephanie L Sansom. Cost effectiveness of hiv prevention interventions in the us. *American journal of preventive medicine*, 50(6):699–708, 2016.

Arielle Lasry, Stephanie L Sansom, Katherine A Hicks, and Vladislav Uzunangelov. A model for allocating cdc's hiv prevention resources in the united states. *Health care management science*, 14:115–124, 2011.

Gregory S Zaric and Margaret L Brandeau. Optimal investment in a portfolio of hiv prevention programs. *Medical Decision Making*, 21(5):391–408, 2001.

Arielle Lasry, Stephanie L Sansom, Katherine A Hicks, and Vladislav Uzunangelov. Allocating hiv prevention funds in the united states: recommendations from an optimization model. *PloS one*, 7(6):e37545, 2012.

Emine Yaylali, Paul G Farnham, Karen L Schneider, Stewart J Landers, Oskian Kouzouian, Arielle Lasry, David W Purcell, Timothy A Green, and Stephanie L Sansom. From theory to practice: implementation of a resource allocation model in health departments. *Journal of public health management and practice: JPHMP*, 22(6):567, 2016.

Jessie L Juusola and Margaret L Brandeau. Hiv treatment and prevention: a simple model to determine optimal investment. *Medical decision making*, 36(3):391–409, 2016.

Dmitry Gromov, Ingo Bulla, Oana Silvia Serea, and Ethan O Romero-Severson. Numerical optimal control for hiv prevention with dynamic budget allocation. *Mathematical Medicine and Biology: A Journal of the IMA*, 35(4): 469–491, 2018.

Emine Yaylali, Paul G Farnham, Stacy Cohen, David W Purcell, Heather Hauck, and Stephanie L Sansom. Optimal allocation of hiv prevention funds for state health departments. *Plos one*, 13(5):e0197421, 2018.

Laura Matrajt, Julia Eaton, Tiffany Leung, and Elizabeth R Brown. Vaccine optimization for covid-19: Who to vaccinate first? *Science Advances*, 7(6):eabf1374, 2021.

Hongjie Yu, Shasha Han, Jun Cai, Juan Yang, Juanjuan Zhang, Qianhui Wu, Wen Zheng, Huilin Shi, Marco Ajelli, and Xiao-Hua Zhou. Dynamic optimization of covid-19 vaccine prioritization in the context of limited supply. unpublished, 2021.

Shasha Han, Jun Cai, Juan Yang, Juanjuan Zhang, Qianhui Wu, Wen Zheng, Huilin Shi, Marco Ajelli, Xiao-Hua Zhou, and Hongjie Yu. Time-varying optimization of covid-19 vaccine prioritization in the context of limited vaccination capacity. *Nature communications*, 12(1):4673, 2021.

Gustavo Barbosa Libotte, Fran Sérgio Lobato, Gustavo Mendes Platt, and Antônio J Silva Neto. Determination of an optimal control strategy for vaccine administration in covid-19 pandemic treatment. *Computer methods and programs in biomedicine*, 196:105664, 2020.

Calvin Tsay, Fernando Lejarza, Mark A Stadtherr, and Michael Baldea. Modeling, state estimation, and optimal control for the us covid-19 outbreak. *Scientific reports*, 10(1):10711, 2020.

Thomas Rawson, Tom Brewer, Dessislava Veltcheva, Chris Huntingford, and Michael B Bonsall. How and when to end the covid-19 lockdown: an optimization approach. *Frontiers in Public Health*, 8:262, 2020.

Gloria Hyunjung Kwak, Lowell Ling, and Pan Hui. Deep reinforcement learning approaches for global public health strategies for covid-19 pandemic. *PloS one*, 16(5):e0251550, 2021.

Pieter JK Libin, Arno Moonens, Timothy Verstraeten, Fabian Perez-Sanjines, Niel Hens, Philippe Lemey, and Ann Nowé. Deep reinforcement learning for large-scale epidemic control. In *Joint European Conference on Machine Learning and Knowledge Discovery in Databases*, pages 155–170. Springer, 2021.

Raghav Awasthi, Keerat Kaur Guliani, Saif Ahmad Khan, Aniket Vashishtha, Mehrab Singh Gill, Arshita Bhatt, Aditya Nagori, Aniket Gupta, Ponnurangam Kumaraguru, and Tavpritesh Sethi. Vacsim: Learning effective strategies for covid-19 vaccine distribution using reinforcement learning. *Intelligence-Based Medicine*, page 100060, 2022.

Hanane Allioui, Mazin Abed Mohammed, Narjes Benameur, Belal Al-Khateeb, Karrar Hameed Abdulkareem, Begonya Garcia-Zapirain, Robertas Damaševičius, and Rytis Maskeliūnas. A multi-agent deep reinforcement learning approach for enhancement of covid-19 ct image segmentation. *Journal of personalized medicine*, 12(2):309, 2022.

Seyed Mohammad Jafar Jalali, Milad Ahmadian, Sajad Ahmadian, Abbas Khosravi, Mamoun Alazab, and Saeid Nahavandi. An oppositional-cauchy based gsk evolutionary algorithm with a novel deep ensemble reinforcement learning strategy for covid-19 diagnosis. *Applied Soft Computing*, 111:107675, 2021.

Varun Kompella, Roberto Capobianco, Stacy Jong, Jonathan Browne, Spencer Fox, Lauren Meyers, Peter Wurman, and Peter Stone. Reinforcement learning for optimization of covid-19 mitigation policies. *arXiv preprint arXiv:2010.10560*, 2020.

R Lakshmana Kumar, Firoz Khan, Sadia Din, Shahab S Band, Amir Mosavi, and Ebuka Ibeke. Recurrent neural network and reinforcement learning model for covid-19 prediction. *Frontiers in public health*, 9, 2021.

Bryan P Bednarski, Akash Deep Singh, and William M Jones. On collaborative reinforcement learning to optimize the redistribution of critical medical supplies throughout the covid-19 pandemic. *Journal of the American Medical Informatics Association*, 28(4):874–878, 2021.

Justin Weltz, Alex Volfovsky, and Eric B Laber. Reinforcement learning methods in public health. *Clinical therapeutics*, 44(1):139–154, 2022.

Volodymyr Mnih, Koray Kavukcuoglu, David Silver, Alex Graves, Ioannis Antonoglou, Daan Wierstra, and Martin Riedmiller. Playing atari with deep reinforcement learning. *arXiv preprint arXiv:1312.5602*, 2013.

Ziyu Wang, Tom Schaul, Matteo Hessel, Hado Hasselt, Marc Lanctot, and Nando Freitas. Dueling network architectures for deep reinforcement learning. In *International conference on machine learning*, pages 1995–2003. PMLR, 2016.

Tuomas Haarnoja, Aurick Zhou, Pieter Abbeel, and Sergey Levine. Soft actor-critic: Off-policy maximum entropy deep reinforcement learning with a stochastic actor. In *International conference on machine learning*, pages 1861–1870. PMLR, 2018.

John Schulman, Filip Wolski, Prafulla Dhariwal, Alec Radford, and Oleg Klimov. Proximal policy optimization algorithms. *arXiv preprint arXiv:1707.06347*, 2017.

Afshin Oroojlooy and Davood Hajinezhad. A review of cooperative multi-agent deep reinforcement learning. *Applied Intelligence*, pages 1–46, 2022.

Tianshu Chu, Jie Wang, Lara Codecà, and Zhaojian Li. Multi-agent deep reinforcement learning for large-scale traffic signal control. *IEEE Transactions on Intelligent Transportation Systems*, 21(3):1086–1095, 2019.

Jiachen Yang, Jipeng Zhang, and Huihui Wang. Urban traffic control in software defined internet of things via a multi-agent deep reinforcement learning approach. *IEEE Transactions on Intelligent Transportation Systems*, 22(6): 3742–3754, 2020.

Yasar Sinan Nasir and Dongning Guo. Multi-agent deep reinforcement learning for dynamic power allocation in wireless networks. *IEEE Journal on Selected Areas in Communications*, 37(10):2239–2250, 2019.

Kaixiang Lin, Renyu Zhao, Zhe Xu, and Jiayu Zhou. Efficient large-scale fleet management via multi-agent deep reinforcement learning. In *Proceedings of the 24th ACM SIGKDD international conference on knowledge discovery & data mining*, pages 1774–1783, 2018.

Liang Yu, Yi Sun, Zhanbo Xu, Chao Shen, Dong Yue, Tao Jiang, and Xiaohong Guan. Multi-agent deep reinforcement learning for hvac control in commercial buildings. *IEEE Transactions on Smart Grid*, 12(1):407–419, 2020.

RWHAP. Ryan White HIV/AIDS Program, Program Parts and Initiatives. `https://ryanwhite.hrsa.gov/about/parts-and-initiatives`, 2022. Accessed: 2023-09-17.

HRSA. Ryan White HIV/AIDS Program FY 2023 EHE Awards. `https://ryanwhite.hrsa.gov/about/parts-and-initiatives/fy-2023-ending-hiv-epidemic-awards`, 2023. Accessed: 2023-09-17.

John Schulman, Sergey Levine, Pieter Abbeel, Michael Jordan, and Philipp Moritz. Trust region policy optimization. In *International conference on machine learning*, pages 1889–1897. PMLR, 2015.

Stephanie L Sansom, Katherine A Hicks, Justin Carrico, Evin U Jacobson, Ram K Shrestha, Timothy A Green, and David W Purcell. Optimal allocation of societal hiv prevention resources to reduce hiv incidence in the united states. *American Journal of Public Health*, 111(1):150–158, 2021.

CDC. HIV Surveillance Report Volume 26, Number 1. `https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-supplemental-report-vol-26-1.pdf`, 2021. (accessed: 09.17.2023).

CDC. HIV Surveillance Report Volume 27, Number 3. `https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-supplemental-report-vol-27-3.pdf`, 2022. (accessed: 09.17.2023).

AHEAD. PrEP Coverage. `https://ahead.hiv.gov/data/prep-coverage`, 2022b. (accessed: 09.17.2023).