

# When will the UK achieve HIV transmission elimination?

## Modelling the impact of current HIV prevention\* efforts on progress towards the 2030 elimination goal: Interim findings



\*Six prevention intervention indicators are considered, including HIV screening, PrEP uptake, timely diagnosis and initiation of ART, and viral suppression.

Laurel Bates<sup>1†</sup>, Alice McGreevy<sup>1</sup>, Verena Schneider<sup>1</sup>, Dr Susie Huntington<sup>1</sup>, Louise Logan<sup>2</sup>, Dr James Jarrett<sup>2</sup>, Dr Deborah Flanagan<sup>2</sup>.

<sup>1</sup>Aquarius Population Health, London, UK. <sup>2</sup>Gilead Sciences, London, UK. <sup>†</sup>Presenting author.

### Background

- The UK government has committed to the ambitious target of eliminating HIV transmission by 2030.
- Great progress has been made in HIV prevention and treatment in the UK, with England reaching the UNAIDS 95-95-95 target in 2023<sup>1</sup>. However, the HIV Action Plan monitoring and evaluation framework 2024 report<sup>1</sup> and recent modelling work in the gay, bisexual and other men-who-have-sex-with-men (GBMSM) population group<sup>2,3</sup> conclude that the goal of elimination by 2030 is unlikely to be met if prevention interventions remain at current levels.
- Previous modelling work has evaluated transmission only among GBMSM. A modelling approach is needed that also considers transmission and interventions in other key groups because in 2023:
  - There was a steep rise in new HIV diagnoses among the heterosexual population in England, compared to 2022.
  - There was a 22% *decrease* in HIV testing at sexual health centres for heterosexual men and a 10% *decrease* in testing for heterosexual and bisexual women compared to 2019<sup>4</sup>.
- Since the publication of previous models, the UK has taken actions to improve the provision of some prevention interventions, including expanding the use of PrEP and introducing ED opt-out HIV screening in high-prevalence areas.

### Aim

Our modelling study aims to assess:

- Will we achieve the zero-transmission target by 2030 if the prevention interventions remain at their current levels? If not, will we reach it in 50 years?
- Will we achieve the current zero-transmission target by 2030 with a moderate increase in prevention interventions?
- How many new transmissions can be avoided over the next 50 years with increased prevention interventions?

The four population groups considered are: GBMSM, heterosexual men, women, and people who inject drugs.

### Conclusions

- Results from our modelling study indicate that the number of new HIV transmissions in England is expected to increase over the next 50 years for heterosexual men, women and people who inject drugs if prevention efforts remain at 2023 levels. In contrast, we expect decreases over time for GBMSM as a result of a higher uptake of prevention measures in this group.
- We predict the number of HIV transmissions for the total population will increase over the next 50 years from 947 in 2024 to 1,186 in 2073 (a 25% increase).
- Without any changes to interventions, we predict that between 2024 and 2073, heterosexual men and women will make up nearly three-quarters of the total new transmissions (73%; 38,315 out of 52,727).
- Our results indicate that England will not reach the 2030 zero-transmission target under current intervention levels or moderate increases in intervention levels. We calculated zero-transmission as less than 100 transmissions per year for the total population (Table 1). However, increasing prevention levels, including screening, PrEP use, timely initiation of ART and viral suppression can help England get closer to this target.
- We find that moderate increases in the prevention interventions could prevent 19,444 new transmissions between 2024 and 2073 (from 52,727 to 33,282). Preventing these transmissions could avoid substantial HIV treatment costs. In England, the lifetime cost of managing HIV ranges from £73,000 to £404,300 per person<sup>6</sup>.
- While great progress has been made in HIV prevention and treatment, particularly among the GBMSM population, a substantial increase in prevention efforts is needed to meet the zero-transmission goal. The HIV Action Plan should consider the most effective prevention strategies to reduce transmissions, such as expanding screening programs. No single intervention will be sufficient to achieve the goal, and increasing investment in a combination of prevention interventions is necessary.
- Further work is underway to understand the intervention levels required to meet the 2030 target.**

### Methods

We adapted a previously published Markov state transition open cohort HIV transmission model (Massey *et al*, 2023<sup>2</sup>). Our model has a 50-year time horizon, and a 3-month cycle length. We used 2023 as the baseline year.

**Population and setting:** Sexually active adults and people who inject drugs aged 16+ living in England. Population estimates are derived from 2023 ONS data<sup>7</sup>, and the UKHSA 2021 ‘Shooting up’ report<sup>8</sup>. Individuals were categorised according to their highest relevant risk of acquiring HIV.

**Intervention:** Scaling up prevention interventions by a ‘moderate’ increase.

**Comparator:** Current levels of prevention interventions.

**Outcomes:** The number of HIV transmissions (acquired in England) each year and whether this number meets the elimination target threshold.

**Elimination target:** The definition of ‘zero-transmissions’ is based on the England-specific HIV Commission targets for 2030<sup>5</sup> (Table 1).

**Table 1. Threshold number of annual transmissions to meet elimination target for England**

Population group	England 2023 population estimates <sup>7,8</sup>	% of total	Threshold number of new HIV transmissions per year to meet elimination target <sup>5</sup>
GBMSM	1,031,801	2.7%	< 50
Heterosexual men	18,072,132	47.8%	< 19
Women	18,577,720	49.2%	< 25
People who inject drugs	88,281	0.2%	< 6
<b>Total</b>	<b>37,769,934</b>	<b>100%</b>	<b>&lt; 100</b>

#### Prevention interventions:

The model considers six indicators of prevention interventions: new PrEP uptake, HIV screening, diagnosis within 3 months of transmission, starting treatment within 3 or 6 months of diagnosis and viral suppression (representing treatment as prevention).

Table 2 shows the values used for current prevention levels and the future scenario with moderate increases in the intervention levels. Values were informed using published data from UKHSA<sup>1</sup>, authors’ analyses<sup>9</sup> and interviews with HIV experts.

- For heterosexual men, women and people who inject drugs, the values used for the future scenario are halfway between the current value and the current value in GBMSM.
- For GBMSM, the scenario reflects what would be considered a substantial, but realistic, increase from their current scenario.
- Changes for the future scenario were implemented linearly between 2023 and 2027.

**Table 2: Input values for the intervention indicators - Current and increased prevention levels\***

	GBMSM	Heterosexual men	Women	People who inject drugs
<b>Current prevention intervention levels</b>				
Annual probability of HIV-negative population with PrEP need starting PrEP**	17.6%	1.1%	1.3%	0.9%
Annual probability of HIV screening	22.8%	3.7%	8.1%	3.7%
Percentage diagnosed within 3 months of transmission	26.0%	9.0%	10.0%	8.0%
Percentage starting treatment within 3 months of diagnosis	83.0%	77.0%	76.0%	61.9%
Percentage starting treatment within 6 months of diagnosis	95.5%	92.0%	93.5%	90.0%
Percentage of people on treatment who are virologically suppressed	98.0%	97.0%	98.0%	93.0%
<b>Moderate increase in prevention levels</b>				
Annual probability of HIV-negative population with PrEP need starting PrEP**	23.0%	9.3%	9.5%	8.8%
Annual probability of HIV screening	35.0%	13.3%	15.6%	13.3%
Percentage diagnosed within 3 months of transmission	35.0%	17.5%	18.0%	17.0%
Percentage starting treatment within 3 months of diagnosis	90.0%	80.0%	79.5%	72.5%
Percentage starting treatment within 6 months of diagnosis	98.0%	93.8%	94.5%	92.8%
Percentage of people on treatment who are virologically suppressed	98.2%	97.5%	98.2%	95.5%

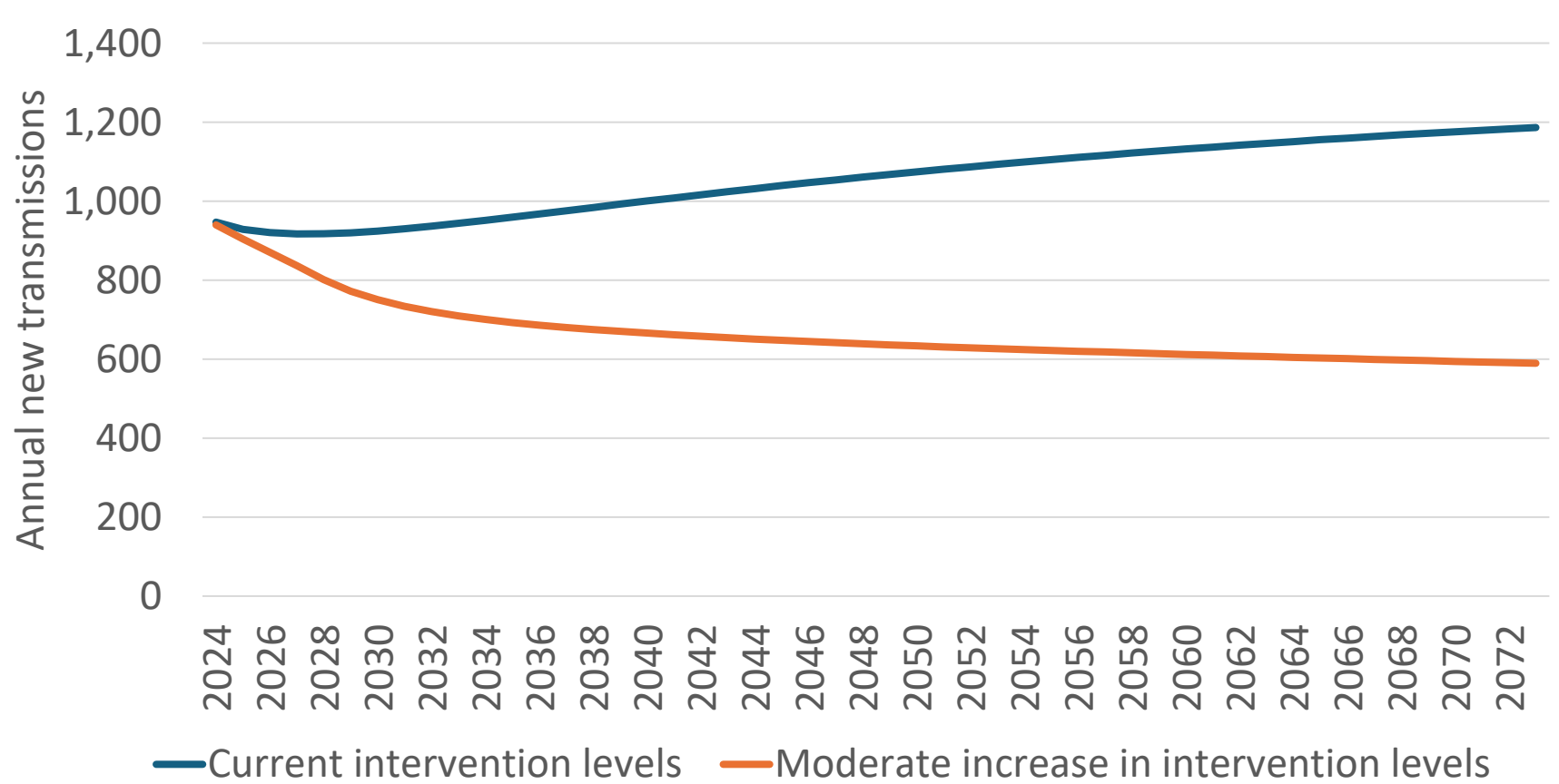
\*Values for the indicators were informed using published data from UKHSA<sup>1</sup> and interviews with HIV experts. \*\*Annual probability of the HIV-negative population with PrEP need starting PrEP is a function of the number of people currently accessing PrEP and the proportion that discontinues PrEP each year. For example, 17.6% for GBMSM current scenario is based on 83,210 currently accessing PrEP and 23.0% in the moderate increase scenario is based on 105,755 accessing PrEP. The proportion of PrEP users discontinuing each year remained at 27% in both cases. PrEP need numbers were informed by Huntington *et al*<sup>9</sup> (manuscript under review).

### Results

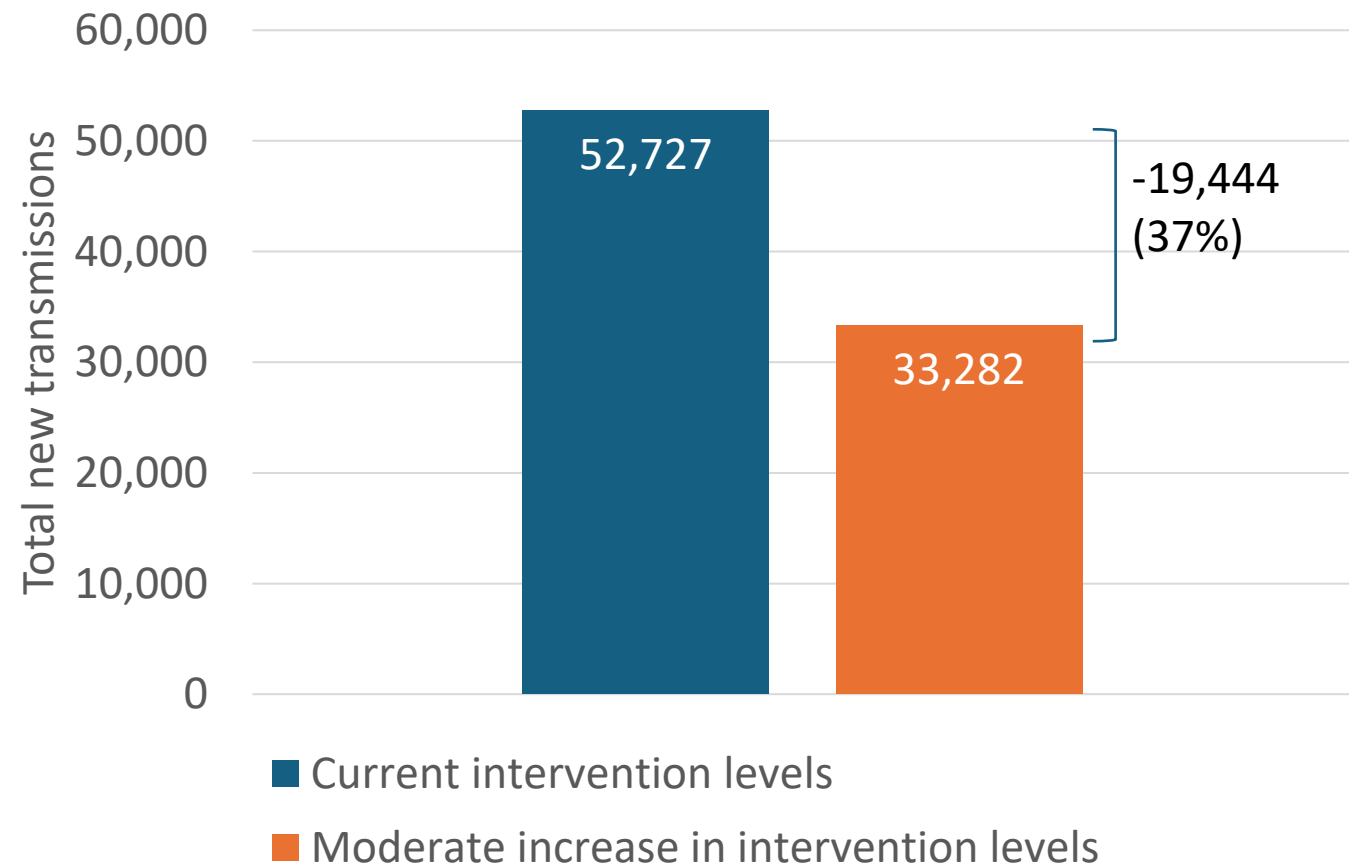
#### Total population

- Our results predict that the number of new transmissions each year will increase over time, if prevention interventions continue at their current levels, from 947 transmissions in 2024 to 1,186 in 2073 (2073 is the end of the 50-year time horizon considered in the model).
- However, with moderate increases in intervention levels, we predict the annual number of new infections will decrease over time, decreasing from 940 in 2024 to 590 in 2073.
  - The downward trend means the number of new transmissions acquired between 2024 and 2073 would decrease by 37%, from 52,727 to 33,282, if intervention levels are increased to the levels in Table 2.
- Our model predicts that England will not achieve transmission elimination in 2030 under current prevention intervention levels, nor will it reach the target by 2073 (i.e., the end of the 50-year time horizon considered in the model). “Zero-transmissions” is defined as less than 100 transmissions per year (Table 1).

**Figure 1: The number of new transmissions per year, 2024 to 2073 – Total population**

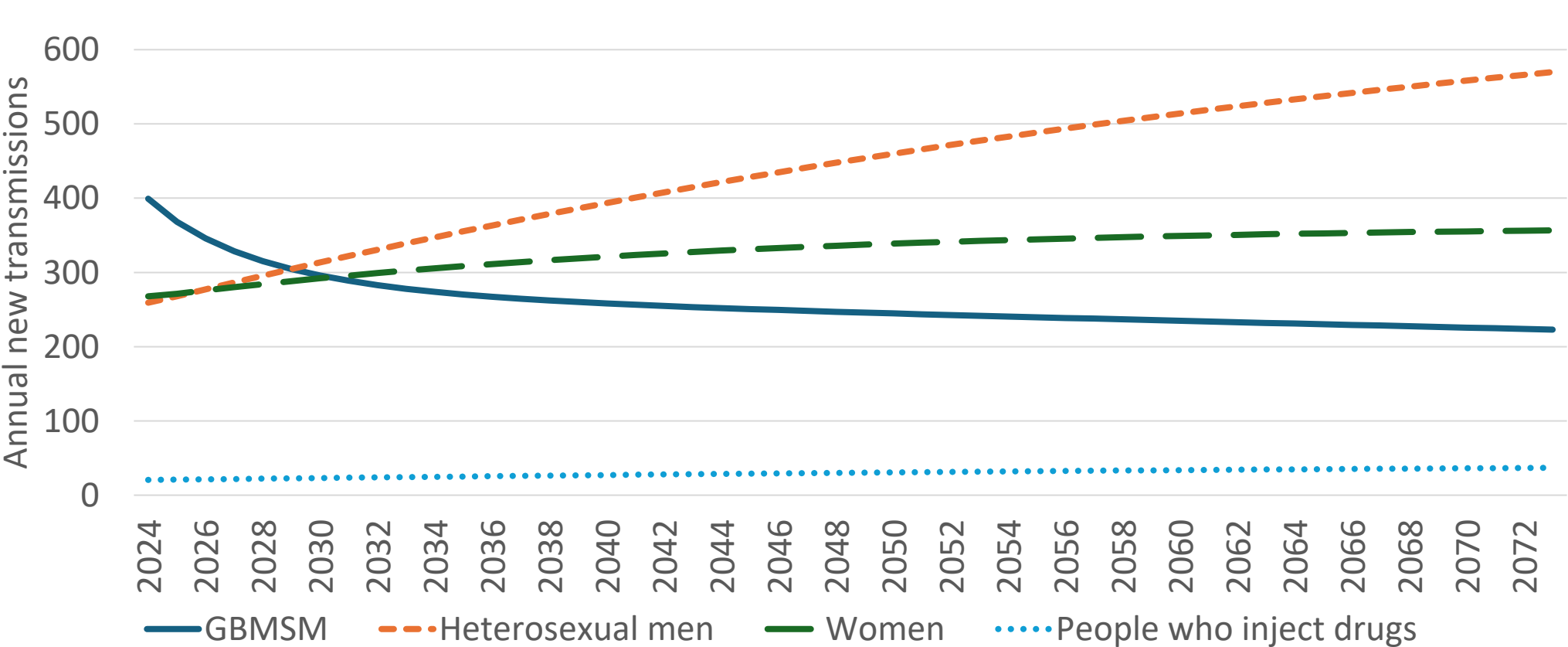


**Figure 2: The number of new transmissions between 2024 to 2073 – Total population**



#### Population groups: current intervention levels

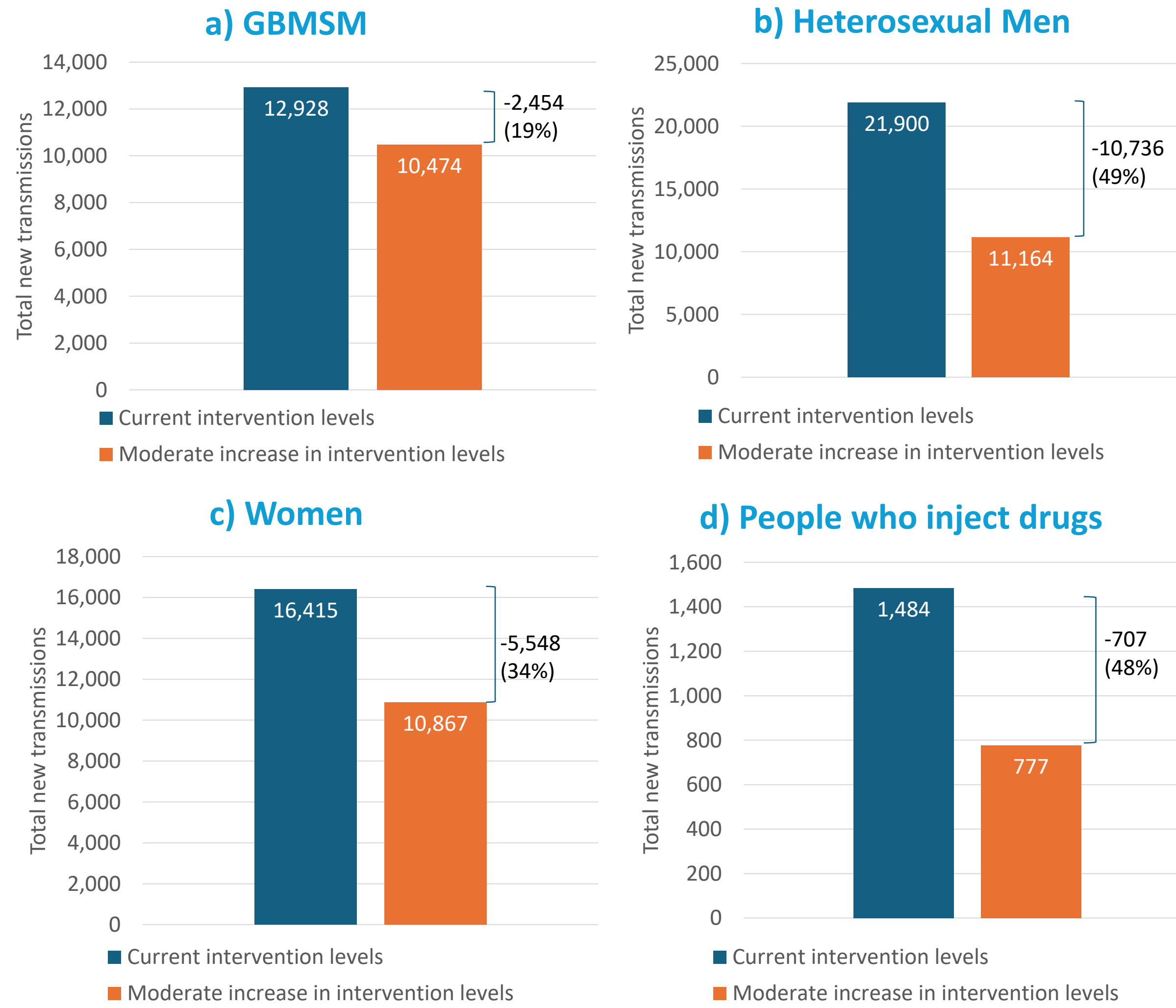
**Figure 3: Number of new transmissions each year under current intervention levels, 2024 to 2073 - By population group**



- If intervention levels remain at current levels, the number of transmissions will increase each year in heterosexual men, women and people who inject drugs.
- However, it will decrease over time for GBMSM as a result of a higher uptake of prevention measures in this group.
- Without any changes to interventions, it is predicted that between 2024 and 2073, the number of new transmissions will be highest in heterosexual men and women, representing nearly three-quarters of the total new transmissions (73%; 38,315 out of 52,727).

#### Population groups: increasing intervention levels

**Figure 4: The number of new transmissions between 2024 to 2073, by population group**



- Our model predicts that the impact of the moderate increase in interventions would be highest amongst heterosexual men and people who inject drugs, decreasing new transmissions between 2043 and 2073 for these groups by 49% and 48%, respectively.
- The lower reduction for women (34%) and GBMSM (19%) reflect higher current intervention uptakes in these two groups (e.g., the current probability of screening for women is higher than heterosexual men due to universal antenatal screening).
- Despite experiencing the highest reduction in transmissions from moderate increases in interventions, the number of new transmissions between 2024 and 2073 is still highest in the heterosexual men group (11,164).

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### Contact

To find out more about this work please speak to Laurel Bates, the presenting author who is attending BHIVA or email [Laurel.Bates@Aquariusph.com](mailto:Laurel.Bates@Aquariusph.com). To find out more about Aquarius, please visit our website [Aquariusph.com](https://www.aquariusph.com), or scan the barcode in the bottom right-hand corner.

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