TECHNICAL NOTE ON AEM EXERCISE FOR PAKISTAN

March – April, 2017
Foreword

Pakistan is faced with a concentrated HIV epidemic that although driven by people who inject drugs is fast expanding in other key populations including men who have sex with men, hijra/transgender, male and female sex workers. The country has witnessed isolated episodes of HIV out breaks from time to time including the most recent outbreak of HIV in chronic renal failure patients undergoing dialysis. The fifth National Integrated Biological and Behavioural Surveillance, Round-5 (2016-17) has reported an estimated prevalence rate of less than 0.1% in the general population but an alarming well-established epidemic in the key populations that continues to escalate. This alarming situation calls for revisiting the National HIV response to develop and implement precision targeted high impact cost-effective interventions to scale-up testing, prevention and treatment services to the vulnerable and affected population.

The Ministry of National Health Services Regulation and Coordination (MoNHSR&C) coordinated the development of the AIDS epidemic model for Pakistan in March-April, 2017 with the support of Global Fund to fight AIDS, TB and Malaria (GFATM), UNAIDS Country team and the UNAIDS Regional Support team, Asia Pacific. The Country technical team comprising of technical experts from the National and Provincial AIDS Control Programme (NACP & PACP), UN partners, CSO, and other stakeholders with the assistance of technical resource persons from UNAIDS Regional support team (RST-AP) developed regional and national baseline models to demonstrate the geographical and population specific epidemic trends in the country. Based on country specific best practices intervention and impact analysis scenarios were constructed to identify high impact population specific HIV services packages with highest efficacy and cost efficiency.

The AEM is a powerful and constructive tool that assists policy makers, programmers, public health professionals and leaders to understand the HIV epidemic and guide decision-makers in making evidence based decisions for a robust HIV response to halt and reverse the spread of the epidemic and meet the AIDS related national and international targets.

Pakistan today needs to gear up its HIV response in light of available epidemiological and scientific evidence to implement effective prevention and treatment programmes in the country, and strategically invest in locations and populations where HIV epidemic is highly concentrated and create an enabling environment for HIV services uptake supported by effective legislation and strategic policy making to end the AIDS epidemic.

Dr. Assad Hafeez
Director General (Health)
Ministry of National Health Services Regulation & Coordination
Government of Pakistan
Acknowledgements

HIV AIDS is a growing public health threat endangering lives of millions of people around the world. HIV needs to be defeated through renewed and strong political commitments, sufficient resources, technical astuteness and programmatic innovations. With over 130,000 people living with HIV (PLHIV) in Pakistan, only an estimated 19,000 are registered in the treatment centers and less than 10,000 PLHIV are on antiretroviral therapy. This necessitates a vigorous and robust national response to curb and curtail the AIDS epidemic, scale-up HIV testing, expand HIV treatment coverage, intensify HIV prevention services to avert new HIV infections, eliminate mother-to-child transmission and cause an ultimate decline in HIV associated morbidity and mortality.

UNAIDS along with its partners has galvanized an international constellation for an accelerated response based on 90-90-90 approach for ending the AIDS epidemic by 2030. HIV responses need to be embedded in broader health and development programmes for a holistic and multi-sectoral approach for a radical decline in new HIV infections and HIV related deaths. A country specific and population centered process based on principles of human rights and health equity needs to be adopted to cause a reduction in HIV associated stigma and discrimination, facilitate empowerment of PLHIV and improve the health and well-being of all people living with HIV.

UNAIDS advocates an evidence based, focused, targeted high impact approach for combating HIV AIDS. The AIDS epidemic model is an effective tool based on epidemiological patterns characteristic of concentrated epidemics where a greater part of HIV transmission occurs among key populations and their sexual partners. The AEM exercises made good use of up-to-date epidemiological evidence to provide reliable population size estimates and projections, and country specific best practices based intervention and impact analysis scenarios to facilitate the national health governing bodies and program managers to give shape to the future epidemic response.

UNAIDS deeply acknowledges the patronage and ownership of the Ministry of National Health Service Regulation and Coordination in successfully conducting the AEM exercises in the country. UNAIDS appreciates the efforts and hard work of the Data Hub team (Regional support team, Asia Pacific) and Country technical team in completion of the AEM work.

UNAIDS hopes that the National AIDS control Program will tune its national response to meet the targets laid out in the National Strategic Plans, Sustainable Development Goals and other national and international commitments.

Dr. Mamadou L Sakho,  
UNAIDS Country Director  
Pakistan & Afghanistan
Note by National Program Manager

HIV AIDS in Pakistan has silently and gradually shifted from a “low prevalence, high risk” to a “concentrated epidemic” in mid-2000s among key populations. Although the epidemic continues to be driven by People who Inject Drugs (PWID) yet considerable increase in HIV prevalence has been noted in the other key populations as reported in recently concluded Integrated Biological and Behavioural Surveillance round (2016-17) in the country. A comparative of IBBS data (2011 & 2016-17) shows that HIV prevalence has increased in all key populations: PWIDS (27.2% → 38.4%), H-TGSW (5.2% → 7.5%), MSW (1.6% → 3.2), FSW (0.6% → 2.2%). Men who have sex with men (MSM) were included in the survey for the first time (2016-17) and an HIV prevalence of 4.5% was found in this key population. Similarly the number of PLHIV has increased from an estimated 77,000 in 2011 to 130,000 in 2016.

The HIV response in the country has evolved over the years in the light of epidemiological and scientific evidence. The National AIDS Control Program (NACP) along with its provincial counterparts (PACPs), UN and development partners, civil society organizations, Association of people living with HIV (APLHIV) and community representatives has been spearheading the national response in the country. As Principal Recipient of the Global Fund (GFATM) grant for Pakistan NACP is mandated to provide prevention, care and support, and treatment services to the HIV infected and affected populations.

The AIDS Epidemic Modelling is a useful and practical exercise that enables HIV data experts to effectively use country specific up-to-date epidemiological evidence and real time data to develop reliable population size estimates and based on country specific best practices construct high impact prevention and treatment scenarios to optimize the program to maximize impact, identify and mitigate key data gaps and connect potential applications of the modelling approaches for strengthening the national HIV response. With the support of UNAIDS and the Global Fund, facilitated by technical experts from the UNAIDS RST-Asia Pacific the country technical team, program experts and relevant stakeholders developed AEM sub-national and national baseline workbooks that were used to develop high impact intervention scenarios for each of the key populations based on key population specific best practices intervention packages. Cities were prioritized based on epidemiological evidence, HIV prevalence of and size of each key population. For PWID 28, MSWs and H/TG-SWs 21 each and for FSWs 12 cities were prioritized for providing comprehensive combination HIV prevention intervention packages. A phased “Treatment for All” approach was recommended to allow the health system to cope with the increased patient turnover and provide effective treatment, prevention, care and support services to all infected and affected by HIV.

NACP believes that ending the AIDS epidemic needs front loading sustainable investments accelerated, well effective, coordinated HIV/AIDS response that needs perseverance, determination and innovative, yet focused targeted strategies to deliver comprehensive HIV prevention, testing, treatment and community led services for people most affected by and at risk of HIV. Every penny invested today in the fight against AIDS will pay great dividends in the future in terms of new infections averted, lives saved, increased productivity and economic prosperity of the country.

Dr. Abdul Baseer Khan Achakzai
National Program Manager
National AIDS Control Program
Pakistan
### Pakistan AEM Technical Team

<table>
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<th>Organization</th>
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<th>District</th>
<th>Organization/Programme</th>
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<tbody>
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<tr>
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<th>Organization/Programme</th>
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INTRODUCTION

Early in 2017, the National AIDS Control Program of Pakistan, in collaboration with provincial AIDS control programs, UNAIDS, WHO, UNICEF, Global Fund project, INGOs, civil society, and its partners, conducted an estimate and projection exercise. The purpose of this work is to estimate and understand the HIV epidemics as well as the dynamics and impact of the epidemic at provincial and national level; and to estimate epidemiology and economic impact of responses such as - estimated infections averted and lives saved by HIV programs and to inform future programming by permitting assessment of impacts of alternative strategies and identifying gaps in data and monitoring and evaluation systems. This process will also help to build national analytic capacity and provide valuable inputs for policy and program planning appropriate to each province’s unique situation.

The outcome of this work is to build an HIV baseline model, intervention scenarios, and impact assessment that can be used as advocacy tools to inform and advocate stakeholders and policy makers on costs of action and costs of inaction. This exercise requires collecting various forms of data:
- Details on the prevalence, distribution and time evolution of HIV in the country.
- Behavioural trends (both risk and preventive behaviours) over time in the various populations affected by the epidemic.
- Information on the coverage, effectiveness and costs of prevention and care responses in those affected populations.
- An understanding of the policy environment and the information needs of key decision makers.

The process of developing Pakistan’s AEM work was led by the National AIDS Program starting in March 2017. A technical working group (TWG) was established to ensure appropriate levels of technical participation and policy guidance.

The TWG participated in two one-week intensive workshop. The first workshop was to review input data and develop AEM baseline for Punjab, Sindh, KPK & Balochistan, and national AEM. Inputs were taken from a careful process of reviewing results from six rounds of IBBS, case reporting, program reports, NASA report in 2014, best practices of current intervention in the country, ad-hoc studies, as well as global best practice for effective interventions. The second workshop aimed to develop policy scenarios that provide picture of an HIV epidemic with different level of interventions and investments. The TWG was responsible for collecting and inputting unit cost, program coverage and program effectiveness, and discussed to develop different intervention scenarios based on their priorities for the response in future. Outcomes of the second workshop provide evidences for decision focusing on interventions that would achieve the greatest impacts on the HIV response and at the same time increase efficiency of these interventions.
SETTING UP BASELINE AEM WORKBOOK

1. Size estimate for key populations

We applied the same method - extrapolation and key populations size estimation based on the results from recent mapping exercises - as that was used in 2015 for FSW, PWID and TG; and updated

- Population size of FSW, PWID, and TG in the sites that have data in 2016 mapping exercise. Where mapping data is not available in the 2016-round, we use data from 2014-round.
- Extrapolated size estimate for cities without mapping data.

In regards to MSM, we developed a method of calculation as below:

- Estimated number MSW by using 2016-round mapping data and extrapolated size estimate for cities without mapping data.
- Calculated number of clients of MSW (considered as MSM1 with higher risk of infection) using the assumptions that
  - Each client buys sex from MSW every 14 days, and therefore number of times client buys sex from MSW per year is 26 times.
  - Number of months of activity (discounting for Ramadan) of MSW: 11 months
  - Number of total sex acts per year by MSW = number of MSWs x mean of clients per month (from IBBS 2016) x number of active months in sex work
  - Number of clients per year= number of total sex acts by MSW per year / number of times a client buys sex per year

- Calculating number of non paying MSM (considered as MSM2 with lower risk of infection) based on following assumptions
  - Consider that the number of non paying partners remains stable
  - Consider that these are long term partners, further multiplication is not required
  - Apply the same logic to all MSM mapped, including MSW

- To estimate population size of key population (KP) of other years, rather than 2016, we multiply the percentage of KP as total male or female 15-49 in 2016 with size of male or female 15-49 population in the specific year.

The 2016 population size estimate result is presented in the table below:
Table 1. 2016 population size estimate

<table>
<thead>
<tr>
<th>Group</th>
<th>Size est. for Punjab</th>
<th>Size est. for Sindh</th>
<th>Size est. for KPK &amp; Balochistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>72,656,116</td>
<td>28,811,908</td>
<td>22,916,674</td>
</tr>
<tr>
<td>PWID 15-49</td>
<td>45,645</td>
<td>42,831</td>
<td>8,872</td>
</tr>
<tr>
<td>FSW</td>
<td>99,356</td>
<td>50,918</td>
<td>21,975</td>
</tr>
<tr>
<td>MSW</td>
<td>24,744</td>
<td>22,513</td>
<td>8,082</td>
</tr>
<tr>
<td>MSM (including MSW)</td>
<td>322,592</td>
<td>371,873</td>
<td>137,749</td>
</tr>
<tr>
<td>TG (including HSW)</td>
<td>26,391</td>
<td>18,257</td>
<td>7,433</td>
</tr>
<tr>
<td>HSW</td>
<td>21,514</td>
<td>14,693</td>
<td>5,982</td>
</tr>
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</table>

*Details size estimate for cities are included in Annex 12.

2. Behaviour data of the business as usual scenario

We used data from IBBS 2005, IBBS 2006-7, IBBS 2008, IBBS 2011, Punjab IBBS 2014, and IBBS 2016 to calculate behavior indicators for each key populations in each city. Weighted average of behavior indicators for each province was calculated, using agreed population size. While IBBS 2014 was conducted in large cities in Punjab, IBBS 2016 was conducted in small cities in the province. Therefore the behavior data are not comparable to draw a trend. We decided to borrow 2014 data point to do weighted average for 2016 data points. Detail of weighted average calculation is presented in Annex 4 (Heterosexual), 5 (PWID), 6 (MSM), and 7 (TG).

Behavior data was compared with data input to the 2015-round AEM. The technical working group (TWG) discussed on data points that fluctuate or does not consistent with current intervention coverage. Below is data input updated for the 2017-AEM round.

Table 2. List of updated data for Punjab

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value in 2016</th>
<th>Source/Assumption</th>
</tr>
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<tbody>
<tr>
<td>FSW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of clients per day</td>
<td>2.9%</td>
<td>IBBS-2014 Data was used. Keep same number for all years</td>
</tr>
<tr>
<td>Percent condom use with clients</td>
<td>64.6%</td>
<td>Weighted average of IBBS Rounds 4 &amp; 5 (2014 &amp; 2016). (Data from Punjab IBBS-2014 for Lahore, Faisalabad, Multan and Sargodha was used as these cities were not covered in National IBBS-2016).</td>
</tr>
<tr>
<td>STI prevalence</td>
<td>7.3%</td>
<td>IBBS 2016 Average of Urethral discharge, Genital ulcer and Genital warts</td>
</tr>
<tr>
<td>PWID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage</td>
<td>Value</td>
<td>Source/Description</td>
</tr>
<tr>
<td>------------</td>
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</tr>
<tr>
<td>Percent of male IDUs in high-risk networks</td>
<td>75%</td>
<td>Consensus from Country Team, based on IBBS-2016 data on % of PWID who inject drugs and share needles and are engaged in sexual activity in a group</td>
</tr>
<tr>
<td>Percent of male IDUs who share needles</td>
<td>36.7%</td>
<td>Weighted average of Punjab IBBS-2014 and National IBBS-2016 (25.3%) was taken as major Punjab cities (Lahore, Faisalabad, Multan, Sargodha, DG Khan, Gujranwala, Gujrat, Sialkot and Sheikhpura) were not included in the National IBBS-2016.</td>
</tr>
<tr>
<td>Percent of male IDUs visiting FSW</td>
<td>12%</td>
<td>Weighted average of Punjab IBBS-2014 and National IBBS-2016</td>
</tr>
<tr>
<td>Percent condom use with female sex worker</td>
<td>64.6%</td>
<td>Used the same percentage of FSW condom use with clients (Weighted average of IBBS 2014 &amp; 2016)</td>
</tr>
</tbody>
</table>

### MSM

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Value</th>
<th>Source/Description</th>
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</thead>
<tbody>
<tr>
<td>Percent of MSM1 visiting male sex workers</td>
<td>8%</td>
<td>Country Team Consensus to use the same data that was used in AEM 2015 round</td>
</tr>
<tr>
<td>Percent of MSM2 visiting male sex workers</td>
<td>3%</td>
<td>Country Team Consensus to use the same data that was used in AEM 2015 round</td>
</tr>
<tr>
<td>Percent condom use in anal sex with MSM1</td>
<td>31.8%</td>
<td>Country Team Consensus based on IBBS 2016 Average</td>
</tr>
<tr>
<td>Percent condom use in anal sex with MSW</td>
<td>24.1%</td>
<td>Weighted average IBBS 2016</td>
</tr>
<tr>
<td>Number of anal sex contacts last week</td>
<td>1</td>
<td>Country team consensus to use the same data that was used in AEM 2015 round</td>
</tr>
</tbody>
</table>

| STI prevalence (MSW) | 9.5% | IBBS-2016 Data. Average of Urethral Discharge, Genital Ulcer, Genital Warts from IBBS 2016 (Based on WHO guidelines of syndromic diagnosis of STIs) |
| STI prevalence ( MSM1) | 3%   | Country Team Consensus to use the same data that was used in AEM 2015 round |
| STI prevalence ( MSM2) | 0.6% | Country Team Consensus to use the same data that was used in AEM 2015 round |

### TG

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average duration selling sex (in years)</td>
<td>16.8</td>
<td>IBBS-2016 Data*1.5.</td>
</tr>
<tr>
<td>Number of anal sex contacts last week with clients</td>
<td>5</td>
<td>IBBS-2016 Data.</td>
</tr>
<tr>
<td>Percent condom use in anal sex with clients</td>
<td>34.7%</td>
<td>Weighted average IBBS-2016</td>
</tr>
</tbody>
</table>
Anal STI prevalence 9.8%

Country team Consensus
A decline in STI prevalence is set due to increase condom use. Based on previous trends it is assumed STI prevalence declines by 2/3.

Table 3. List of updated data for Sindh

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value in 2016</th>
<th>Source/Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FSW</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of clients per day</td>
<td>3.1</td>
<td>Weighted average of IBBS R-5 data for 6 Sindh cities</td>
</tr>
<tr>
<td>Percent condom use with clients</td>
<td>51.5%</td>
<td>Weighted average IBBS-2016</td>
</tr>
<tr>
<td>STI prevalence among FSW</td>
<td>11.8%</td>
<td>Data is based on reported STI symptoms from IBBS 2016. It is based on the averages of reported genital warts, genital ulcers and genital discharge. Interpolate between 18% and 11.8% for a smooth trend that is in line with condom use</td>
</tr>
<tr>
<td>Average duration of selling sex</td>
<td>10.2</td>
<td>IBBS 2016 weighted average of 6 cities * 1.8 (based on age structure of FSW in IBBS 2016)</td>
</tr>
<tr>
<td><strong>PWID</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of male IDUs in high-risk networks</td>
<td>75%</td>
<td>Country team consensus based on IBBS R-2016 data that indicates the percentage of IDUs in high risk networks.</td>
</tr>
<tr>
<td>Percent of male IDUs who share needles</td>
<td>44.5</td>
<td>Weighted average of IBBS 2016</td>
</tr>
<tr>
<td>Number of injections per day</td>
<td>2.7</td>
<td>Weighted average of IBBS 2016 (6 cities)</td>
</tr>
<tr>
<td>Average duration of injecting behaviour</td>
<td></td>
<td>Weighted average of IBBS 2016 (6 cities)</td>
</tr>
<tr>
<td>Percent of male IDUs visiting FSW</td>
<td>19.5%</td>
<td>Weighted average of IBBS-2016 Data</td>
</tr>
<tr>
<td>Percent condom use with FSW</td>
<td>51.5%</td>
<td>Consensus based assumption that it would be the same level as FSW condom use with clients</td>
</tr>
<tr>
<td>Percent condom use with spouse or regular partner</td>
<td>22.9%</td>
<td>Weighted average of IBBS-2016 Data</td>
</tr>
<tr>
<td><strong>MSM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of MSM visiting male sex workers</td>
<td>22.8%</td>
<td>IBBS-2016 Data excluding Karachi as it was considered an outlier due its very high visiting</td>
</tr>
<tr>
<td>Parameter</td>
<td>Value</td>
<td>Notes</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Percent of MSM2 visiting male sex workers</td>
<td>7.6%</td>
<td>Country team assumed that the proportion of MSM2 visiting MSW is equal to 1/3 of that among MSM1.</td>
</tr>
<tr>
<td>Percent condom use in anal sex with male sex workers (MSM visiting SW)</td>
<td>30.9%</td>
<td>Weighted average of 6 cities from IBBS 2016. This is the first available data from survey. Interpolated with default value with 1975.</td>
</tr>
<tr>
<td>Percent condom use in anal sex with MSM1</td>
<td>31.4%</td>
<td>Weighted average IBBS-2016 of 4 Sindh cities (Hyderabad, Larkana, Nawabshah &amp; Mirpurkhas). Due to lack of data in earlier years, interpolate</td>
</tr>
<tr>
<td>Percent condom use in anal sex with MSM2</td>
<td>31.4%</td>
<td>Set same condom use level as MSM1</td>
</tr>
<tr>
<td>Number of anal sex contacts last week MSM 1</td>
<td>2.1</td>
<td>IBBS-2016 Data.</td>
</tr>
<tr>
<td>Number of anal sex contacts last week MSM 2</td>
<td>0.53</td>
<td>The country team assumed to set the value at 25% of MSM1 data.</td>
</tr>
<tr>
<td>STI prevalence MSM 1</td>
<td>15%</td>
<td>Based on reported STI symptoms from IBBS 2016. It is based on the averages of reported genital warts, genital ulcers and anal discharge.</td>
</tr>
<tr>
<td>STI prevalence MSM 2</td>
<td>2.5%</td>
<td>Consensus assumption based on risk-levels</td>
</tr>
<tr>
<td>STI prevalence MSW</td>
<td>15%</td>
<td>Assumption: 1.5 times that of MSM</td>
</tr>
<tr>
<td>Average duration of selling sex among MSW</td>
<td>8.8</td>
<td>Set to be equal to previous years</td>
</tr>
<tr>
<td>MSW - number of anal sex contacts last week</td>
<td>7.13</td>
<td>Based on IBBS R-5 2016 data.</td>
</tr>
<tr>
<td>TG: Number of anal sex contacts last week with clients</td>
<td>7.9</td>
<td>IBBS-2016 Data.</td>
</tr>
<tr>
<td>TG: Percent condom use in anal sex with clients</td>
<td>22.4%</td>
<td>Weighted average IBBS-2016.</td>
</tr>
<tr>
<td>TG: Anal STI prevalence</td>
<td>12.2%</td>
<td>No STI Data available. Country team Consensus A decline in STI prevalence is set due to increase condom use. Based on previous trends it is assumed STI prevalence declines by 1/3.</td>
</tr>
</tbody>
</table>
### Table 4. List of updated data for Khyber Pakhtunkhwa (KPK) & BALOCHISTAN

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value in 2016</th>
<th>Source/Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FSW</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of clients per day</td>
<td>1.5</td>
<td>Weighted average of 4 cities of IBBS 2016 Keep same number for all years</td>
</tr>
<tr>
<td>Percent condom use with clients</td>
<td>41.7%</td>
<td>Weighted average of IBBS 2016 was 81% which was too high in areas with small scale intervention. TWG decided to use IBBS 2011 data point.</td>
</tr>
<tr>
<td><strong>PWID</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of male IDUs in high-risk networks</td>
<td>75%</td>
<td>Consensus from country team, based on IBBS 2016 data on % of PWID who use drug in group</td>
</tr>
<tr>
<td>Percent of male IDUs who share needles</td>
<td>61.5%</td>
<td>Used data from IBBS 2011. IBBS 2016 data point is too low in comparison to IBBS 2011 while there is small scale intervention in KPK &amp; BALOCHISTAN.</td>
</tr>
<tr>
<td><strong>MSM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of MSM1 visiting male sex workers</td>
<td>24.7%</td>
<td>IBBS 2016 weighted average Interpolate data from 2000 – 2016</td>
</tr>
<tr>
<td>Percent condom use in anal sex with male sex workers</td>
<td>16.2%</td>
<td>IBBS 2016 weighted average Interpolate data from 1990 – 2016</td>
</tr>
<tr>
<td>Number of anal sex contacts last week among MSW</td>
<td>4.6</td>
<td>IBBS 2016 weighted average Keep the same number for all years</td>
</tr>
<tr>
<td>STI prevalence among MSW</td>
<td>6.6%</td>
<td>No data available. Assumption: keep the similar trend as STI prevalence trend among FSW</td>
</tr>
<tr>
<td>Other data for MSM1, MSM2 and MSW remain the same as the previous AEM round</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TG</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of anal sex contacts last week with clients among HSW</td>
<td>5.4</td>
<td>Average of average IBBS 2016 (2.8) and IBBS 2011 (7.9). IBBS 2016 data point is too low.</td>
</tr>
<tr>
<td>Percent condom use in anal sex with clients among HSW</td>
<td>44.8%</td>
<td>IBBS 2016 weighted average Interpolate data from 2011 – 2016</td>
</tr>
<tr>
<td>Anal STI prevalence among HSW</td>
<td>9.9%</td>
<td>% of condom use increases by 28% between 2011-2016. Assume STI prevalence declines by 2/3 of the % (18.67%).</td>
</tr>
</tbody>
</table>

Currently lower risk populations
Males who are not now in at-risk populations | 433 | Calculated data from the treatment center register with assumption that 20% of those enrolled in treatment centres in Sindh are migrants and 90% of migrants deported back to Pakistan (due to HIV + status) are registered at the treatment centers. Interpolate data from 2012-2016

3. ART data

In 2016, Pakistan National AIDS Program conducted a validation of ART data. Updated ART data for the period 2011-2016 for each province is used for 2017-round AEM exercise.

The updated ART data for the period 2011-2016 is presented in the table below:

Table 5. Number of PLHIV who currently receiving ARV by year

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>402</td>
<td>873</td>
<td>816</td>
<td>1,578</td>
<td>1,982</td>
<td>2,754</td>
</tr>
<tr>
<td>Female</td>
<td>171</td>
<td>315</td>
<td>395</td>
<td>569</td>
<td>606</td>
<td>776</td>
</tr>
<tr>
<td>Sindh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>384</td>
<td>578</td>
<td>818</td>
<td>1174</td>
<td>1614</td>
<td>2019</td>
</tr>
<tr>
<td>Female</td>
<td>112</td>
<td>149</td>
<td>192</td>
<td>264</td>
<td>305</td>
<td>438</td>
</tr>
<tr>
<td>KPK &amp; BALOCHISTAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>701</td>
<td>807</td>
<td>932</td>
<td>1297</td>
<td>1482</td>
<td>1878</td>
</tr>
<tr>
<td>Female</td>
<td>240</td>
<td>346</td>
<td>332</td>
<td>366</td>
<td>595</td>
<td>689</td>
</tr>
</tbody>
</table>

* Details ART data is included in Annex 8.

4. Weighted average of HIV prevalence

We used data from IBBS 2005, IBBS 2006-7, IBBS 2008, IBBS 2011, IBBS 2014, and IBBS 2016 to calculate the HIV prevalence for each key populations in each city. The trend of HIV prevalence in each city was reviewed to identify illogical data points, such as sudden drop and then rapid increase in short period. Assumption for each illogical data point is presented in Annex 2.

While IBBS 2014 was conducted in large cities in Punjab, IBBS 2016 was conducted in small cities in the province. Therefore the HIV prevalence are not comparable to draw a trend. We decided to borrow 2014 data point to do weighted average for 2016 data points.

After the TWG agreed on the trend of HIV prevalence in each city, we calculated the weighted average
of HIV prevalence for each province, using agreed population size.

The trends of HIV prevalence by province used for fitting the AEM curve are as below:

Table 6. The trend of HIV prevalence used for fitting the AEM

<table>
<thead>
<tr>
<th>Province</th>
<th>2005</th>
<th>2006</th>
<th>2008</th>
<th>2011</th>
<th>2014/6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab FSW</td>
<td>0.00%</td>
<td></td>
<td>0.36%</td>
<td>0.60%</td>
<td></td>
</tr>
<tr>
<td>Punjab PWID</td>
<td>9.79%</td>
<td>12.67%</td>
<td>14.20%</td>
<td>42.89%</td>
<td>37.95%</td>
</tr>
<tr>
<td>Punjab MSW</td>
<td>0.00%</td>
<td>0.85%</td>
<td>1.17%</td>
<td>0.96%</td>
<td>3.19%</td>
</tr>
<tr>
<td>Punjab HSW</td>
<td>0.34%</td>
<td>0.33%</td>
<td>2.49%</td>
<td>3.64%</td>
<td>3.35%</td>
</tr>
<tr>
<td>Sindh FSW</td>
<td></td>
<td>0.03%</td>
<td></td>
<td>1.75%</td>
<td>2.75%</td>
</tr>
<tr>
<td>Sindh PWID</td>
<td>23.27%</td>
<td>28.82%</td>
<td>35.07%</td>
<td>39.08%</td>
<td>42.09%</td>
</tr>
<tr>
<td>Sindh MSW</td>
<td>2.89%</td>
<td>3.63%</td>
<td>2.41%</td>
<td>5.15%</td>
<td>7.69%</td>
</tr>
<tr>
<td>Sindh HSW</td>
<td>1.48%</td>
<td>1.39%</td>
<td>5.03%</td>
<td>11.47%</td>
<td>11.82%</td>
</tr>
<tr>
<td>KPK &amp; BALOCHISTAN FSW</td>
<td>0.00%</td>
<td></td>
<td>0.36%</td>
<td>0.46%</td>
<td></td>
</tr>
<tr>
<td>KPK &amp; BALOCHISTAN PWID</td>
<td>2.31%</td>
<td>3.63%</td>
<td>11.17%</td>
<td>10.04%</td>
<td></td>
</tr>
<tr>
<td>KPK &amp; BALOCHISTAN MSW</td>
<td>0.00%</td>
<td>1.32%</td>
<td>1.01%</td>
<td>1.90%</td>
<td></td>
</tr>
<tr>
<td>KPK &amp; BALOCHISTAN HSW</td>
<td>0.67%</td>
<td>0.36%</td>
<td>1.68%</td>
<td>2.72%</td>
<td></td>
</tr>
</tbody>
</table>

* Detailed HIV prevalence data is included in Annex 2.
SETTING UP INTERVENTION SCENARIO

To carry out an analysis of effective interventions in the future, the TWG agreed to set up four scenarios including:

a. Business as Usual Scenario: Baseline intervention scenario assumes intervention coverage remains the same from 2016 onward;
b. High Impact without OST: assumes a significant increase of intervention coverage targeting key populations and cities with high burden of HIV. Intervention coverage among other cities and populations will be maintained or gradually increased. The interventions will draw the programme effectiveness from experience of best practices in the country.
c. High Impact with OST: assumes the same intervention expansion as in the High Impact without OST Scenario, adding an gradually increase of OST coverage for PWID.
d. Fast-Track Scenario: assumes that quality and effective interventions are put to scale to end AIDS epidemic as a public threat and that includes context appropriate and adequate commodity provided to KP through community, quality peer education outreach with increased frequency and effectiveness, STI referral and treatment through community outreach, community capacity building and community based testing, linkage to care and adherence support.

Three key elements that inform the development of scenarios are:

1) **Target setting**, current programme coverage and key population specific intervention
2) **Unit costs** calculation based on the intensity, scale, and component of interventions
3) **Programme effectiveness parameters** adjustment for each intervention package,

These parameters and assumptions were informed by available data in the country or study and experience from other countries, and presented in the section below.

1. **Business as Usual Scenario**

**Coverage**

We used data from IBBS 2016 and assumptions to estimate the current coverage in 2016. The TWG discussed and defined that FSW, MSW or HSW is covered by prevention intervention if they received condoms and being tested for HIV in the last 12 months. In case of PWID, a person is covered by prevention intervention if he received new needles/syringes and being tested for HIV in the last 12 months.

Baseline coverage is presented in the table below:
Table 7. Baseline coverage of HIV intervention by key population and by province

<table>
<thead>
<tr>
<th>Provinces</th>
<th>PWID</th>
<th>FSW</th>
<th>MSW</th>
<th>HSW</th>
<th>MSM1</th>
<th>MSM2</th>
<th>Adult treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Source)</td>
<td>IBBS 2016</td>
<td>IBBS 2016</td>
<td>IBBS 2016</td>
<td>IBBS 2016</td>
<td>Assumption</td>
<td>Assumption</td>
<td>AEM output</td>
</tr>
<tr>
<td>Punjab</td>
<td>30%</td>
<td>10.5%</td>
<td>13.6%</td>
<td>16.9%</td>
<td>1/3 of</td>
<td>1/3</td>
<td>8.1%</td>
</tr>
<tr>
<td>Sindh</td>
<td>7.5%</td>
<td>5.6%</td>
<td>20.9%</td>
<td>22.2%</td>
<td>MSW</td>
<td>6.6%</td>
<td></td>
</tr>
<tr>
<td>KPK &amp; Balochistan</td>
<td>2.5%</td>
<td>1%</td>
<td>1.5%</td>
<td>1.2%</td>
<td>Assumption</td>
<td>36.1%</td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>21.7%</td>
<td>7.8%</td>
<td>13.8%</td>
<td>16.6%</td>
<td></td>
<td>11.2%</td>
<td></td>
</tr>
</tbody>
</table>

See Annex B.1. for the detail calculation of coverage for PWID, FSW, MSW and HSW.

In the Business as Usual Scenario, we assume that the 2016 coverage will remain the same for the years after.

**Cost of intervention (USD)**

Table 8. Unit cost of intervention by key populations and provinces

<table>
<thead>
<tr>
<th>Provinces</th>
<th>PWID</th>
<th>FSW</th>
<th>MSW</th>
<th>HSW</th>
<th>MSM1</th>
<th>MSM2</th>
<th>Adult treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab</td>
<td>193</td>
<td>92</td>
<td>92</td>
<td>92</td>
<td>Use MSW unit cost</td>
<td>Use MSW unit cost</td>
<td>217 (Punjab, KPK &amp; Balochistan) 202 (Sindh)</td>
</tr>
<tr>
<td>Sindh</td>
<td>193</td>
<td>62</td>
<td>69</td>
<td>69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KPK &amp; Balochistan</td>
<td>197.5</td>
<td>97.5</td>
<td>107.5</td>
<td>107.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Assumption: All unit costs were added management cost (20% of total unit cost).

In Punjab:

- Unit cost for prevention for FSW, MSW and HSW was the sum of testing cost (4.2 USD/head/year – provided by Punjab PC1), cost for outreach. Unit cost for outreach was calculated based on the assumption that one outreach worker can reach approximately 50 clients and received a salary of 30,000 PKR/month.
- Unit cost for PWID was calculated by adding the cost for testing, cost for outreach workers (as estimated above for other KP in the province), cost for needles and syringes.

In Sindh, the unit cost was taken from the estimate conducted by Planning Commission, Health Department of Government of Sindh. The estimation was done for the phase II of the Scheme for FY 2016-2019 on enhancement of HIV/AIDS Control Program with the aim to halt new HIV infections and prevent the spread of HIV/AIDS among key populations as well as the general population in Sindh, increase access to treatment and improve treatment adherence, reduce HIV related morbidity & mortality and increase quality of life among PLHIV, and increase the sustainability of the response.

In KPK and Balochistan, the unit cost was provided by the TWG members of the respective provinces.
and it is similar to the unit cost used from the 2015 AEM round. We took the average unit cost of KPK and Balochistan to estimate the unit cost for the AEM work for the combined region (KPK & BALOCHISTAN).

ART unit cost was estimated using unit cost by each treatment regimen, adding cost for CD4 count twice a year and viral load test once a year and OI diagnosis and prophylaxis, then weighted with number of patients receiving each regimen in 2016. Cost for OI treatment is included in other health program, not HIV, therefore it was not included in this business as usual scenario. These regimens include the 1st line, 2nd line and 3rd line treatment. It does not include treatment cost for children as AEM is using data input from adults only.

See Annex B.2. for the detail information on unit costs for Business as Usual Scenario.

2. High Impact Without OST Scenario

High priority and maintenance cities by key population

There are 106 cities in 4 provinces in Pakistan, with different burden of the HIV epidemic. The TWG discussed and agreed with the approach to give high priority for key population and cities with high burden of HIV, to make a high impact with cost-effective interventions.

In each province, we estimated number of PLHIV for each KP, based on population size and HIV prevalence (either from IBBS 2014/2016 if available, or estimated prevalence from provincial AEM workbook). We then selected cities with highest number of PLHIV among each KP, that could help to reach the set target (see section 2.3 below for target setting).

The table below present number of cities in each province that should be given priority for rapid increase of prevention coverage. In non-selected cities, prevention coverage will remain at the same level, or gradually increase to 30% (in KPK and Balochistan).

Table 9. Number of high priority cities for intervention among each KP

<table>
<thead>
<tr>
<th>Province</th>
<th>High priority among FSW</th>
<th>High priority among PWID</th>
<th>High priority among HSW</th>
<th>High priority among MSW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab</td>
<td>4</td>
<td>19</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>Sindh</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>KPK</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Balochistan</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>28</td>
<td>21</td>
<td>21</td>
</tr>
</tbody>
</table>

The list of high priority cities is presented in the Annex B.3.

Best practice - Description of intervention

During the second workshop in Lahore, the National AIDS Program invited representatives from NGOs
who currently carry out intervention for PWID, MSW, HSW, and FSW to present and share their program implementation experience, and achievements.

The TWG agreed on the intervention package for each KP, based on current experience in the country, is as below:

Table 10. Description of intervention package

<table>
<thead>
<tr>
<th>Intervention Package for PWID</th>
</tr>
</thead>
<tbody>
<tr>
<td>- NSEP Services: Provision of new syringes, needles, band-aids and alcohol swabs; collection of used syringes and needles; provision of condoms; provision of hygiene services; Behavior change communication messages on HIV, safe sexual practices, safe injecting practices and STIs</td>
</tr>
<tr>
<td>- HIV Testing &amp; Counseling for PWID and spouse.</td>
</tr>
<tr>
<td>- Spouse Prevention Program: Provision of condoms, counseling on HIV and safer sexual practices, provision of living support package, referral to PPTCT centers.</td>
</tr>
<tr>
<td>- Referral to ART and adherence support.</td>
</tr>
<tr>
<td>- STI diagnosis and treatment.</td>
</tr>
<tr>
<td>- Paramedic and Basic Medical Care: Antiseptic dressing for wounds and abscesses, Referral to private medical practitioners for basic medical care.</td>
</tr>
<tr>
<td>- ART Adherence Unit: Residential care for 8 weeks for detoxification, Initiation and maintenance on ART and adherence support.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intervention Package for MSW</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Behavioral change communication through outreach (includes Condom &amp; Lubes, IEC material)</td>
</tr>
<tr>
<td>- Drop In Center facility (for repeat BCC /Psycho social support &amp; Counselling)</td>
</tr>
<tr>
<td>- VCCT with pre &amp; post counselling &amp; psychological counselling (community-based HIV testing)</td>
</tr>
<tr>
<td>- STI diagnosis &amp; Treatment</td>
</tr>
<tr>
<td>- Referral support to PLHIV clients with strong follow-up</td>
</tr>
<tr>
<td>- Condoms &amp; lubes distribution</td>
</tr>
<tr>
<td>- Career counselling and family counselling in DIC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intervention Package for HSW</th>
</tr>
</thead>
<tbody>
<tr>
<td>- BCC - Behavioral change communication through outreach (includes Condom &amp; Lubes, IEC material)</td>
</tr>
<tr>
<td>- Drop In Center facility (for repeat BCC /Psycho social support &amp; Counselling)</td>
</tr>
<tr>
<td>- VCCT with pre &amp; post counselling &amp; psychological counselling (community-based HIV testing)</td>
</tr>
<tr>
<td>- STI diagnosis &amp; Treatment</td>
</tr>
<tr>
<td>- Referral support to PLHIV clients with strong follow-up</td>
</tr>
<tr>
<td>- Condoms &amp; lubes distribution</td>
</tr>
<tr>
<td>- Career counselling and family counselling in DIC</td>
</tr>
</tbody>
</table>

| Intervention Package for FSW |
- Establishment of Drop-In Centers (DIC) to deliver services to FSWs;
  - Screening/testing of HIV, Hep-B, Hep-C, Syphilis and PAP Smear
  - Vaccination of Hep-B in case of non-reactive;
  - Syndromic Management of STIs;
  - Ensuring confidentiality, collection of client data and issuance of vaccination cards to clients for access to services
- Community based outreach through peer educators for behavior change;
- Establish condom distribution network to enhance safe sex practices
- Promotion of an enabling environment in the project area;
- Registration of FSWs through bio-metric registration system developed by PACP.

### Treatment

- Treat all from 2018 with a phased approach (starting from select high priority cities/districts)
- ARV
- One CD4 count test at ART initiation
- Annual viral load test
- OI diagnosis and prophylaxis (cotrimoxazole and INH)
- Link to care and adherence support

### Coverage

To increase cost-effectiveness of the intervention, the TWG proposed to select high priority cities where there are high burden of HIV to implement intensive intervention. The rest of cities with lower burden of HIV will be provided with intervention at maintenance or gradually increased level. Coverage was set up for 2021 (as of the timeline of national strategic plan) and 2030. The list of cities with more intensive intervention coverage is presented in the Annex B.3. Table below presented coverage target, breakdown for cities with high impact intervention coverage and maintenance cities.

#### Table 11. Coverage target by 2021 by high priority and maintenance cities

<table>
<thead>
<tr>
<th>Group of cities</th>
<th>Number of KP</th>
<th>Level of coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PWID</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High priority</td>
<td>38,735</td>
<td>85%</td>
</tr>
<tr>
<td>Maintenance</td>
<td>14,446</td>
<td>30%</td>
</tr>
<tr>
<td>All</td>
<td>53,181</td>
<td>70%</td>
</tr>
<tr>
<td>Sindh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High priority</td>
<td>31,604</td>
<td>70%</td>
</tr>
<tr>
<td>Maintenance</td>
<td>18,299</td>
<td>10%</td>
</tr>
<tr>
<td>All</td>
<td>49,903</td>
<td>48%</td>
</tr>
<tr>
<td>KPK &amp; Balochistan</td>
<td>High priority</td>
<td>3,823</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>All</td>
<td>113,421</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FSW</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab</td>
<td>High priority</td>
<td>46,085</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>54,468</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>100,553</td>
</tr>
<tr>
<td>Sindh</td>
<td>High priority</td>
<td>39,207</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>11,711</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>50,918</td>
</tr>
<tr>
<td>KPK &amp; Balochistan</td>
<td>High priority</td>
<td>7,880</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>14,095</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>26,861</td>
</tr>
<tr>
<td>National</td>
<td>All</td>
<td>173,446</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MSW</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab</td>
<td>High priority</td>
<td>19,608</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>5,136</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>24,744</td>
</tr>
<tr>
<td>Sindh</td>
<td>High priority</td>
<td>17,940</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>4,573</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>22,513</td>
</tr>
<tr>
<td>KPK &amp; Balochistan</td>
<td>High priority</td>
<td>2,924</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>5,158</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>8,082</td>
</tr>
<tr>
<td>National</td>
<td>All</td>
<td>55,340</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HSW</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab</td>
<td>High priority</td>
<td>16,630</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>4,884</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>21,514</td>
</tr>
<tr>
<td>Sindh</td>
<td>High priority</td>
<td>10,126</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>4,567</td>
</tr>
</tbody>
</table>
From the table above, we calculated the weighted average target for each province, in 2021. Coverage for the year in between 2016 and 2021, and 2021 – 2030, was interpolated. Coverage target for 2030 was set to be 70% or 90%, depends on the level of risk of populations and set target coverage in 2021.

Calculation of coverage target for treatment: One of the issue that was brought up to the discussion is that we may set a high target for treatment but the program may not test enough people to send them for treatment. To develop a realistic target for treatment, we estimated number of KP infected with HIV who would be reached by prevention intervention, including HIV testing, and received ART among all KP infected with HIV in 2021 that was estimated from AEM baseline. These calculations informed the treatment target for 2021. Treatment target between 2016 and 2021 was interpolated. Treatment target for 2030 was set to be 80%. Treatment for all with phased approach (starting from select high priority cities/districts) is assumed to be provided starting from 2018. See detail calculation in the Annex B.3. on list of prioritized cities and prevention/treatment coverage target.

The table below presents the coverage for each KP and for treatment in both priority and maintenance cities, by year.

Table 12. Intervention coverage target for each KP and for treatment in both priority and maintenance cities, by year

<table>
<thead>
<tr>
<th></th>
<th>2016 (baseline)</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSW</td>
<td>10.5%</td>
<td>18%</td>
<td>25%</td>
<td>32%</td>
<td>40%</td>
<td>47%</td>
<td>70%</td>
</tr>
<tr>
<td>PWID</td>
<td>30%</td>
<td>38%</td>
<td>46%</td>
<td>54%</td>
<td>62%</td>
<td>70%</td>
<td>80%</td>
</tr>
<tr>
<td>MSW</td>
<td>13.6%</td>
<td>25%</td>
<td>36%</td>
<td>47%</td>
<td>59%</td>
<td>70%</td>
<td>80%</td>
</tr>
<tr>
<td>MSM clients</td>
<td>4.5%</td>
<td>18%</td>
<td>31%</td>
<td>44%</td>
<td>57%</td>
<td>70%</td>
<td>80%</td>
</tr>
<tr>
<td>Non-paying MSM</td>
<td>1.5%</td>
<td>8%</td>
<td>14%</td>
<td>20%</td>
<td>27%</td>
<td>33%</td>
<td>70%</td>
</tr>
<tr>
<td>HSW</td>
<td>16.9%</td>
<td>27%</td>
<td>38%</td>
<td>49%</td>
<td>59%</td>
<td>70%</td>
<td>80%</td>
</tr>
<tr>
<td>Treatment</td>
<td>8.1%</td>
<td>18%</td>
<td>27%</td>
<td>37%</td>
<td>46%</td>
<td>56%</td>
<td>80%</td>
</tr>
<tr>
<td>Sindh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSW</td>
<td>5.6%</td>
<td>16%</td>
<td>26%</td>
<td>36%</td>
<td>46%</td>
<td>56%</td>
<td>70%</td>
</tr>
<tr>
<td>Key population</td>
<td>Unit cost (USD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSW</td>
<td>131.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PWID (NEP)</td>
<td>218</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSW, HSW, MSM</td>
<td>71.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>247</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See Annex B.4. for detail calculation.

Unit cost

Unit cost for PWID high impact scenario was taken from the actual unit cost of the PWID-intervention best practice in the country by Nai Zindagi Trust. Unit cost for MSW/HSW was taken from the MSW/HSW-intervention best practices conducted by Dostana organization, adding cost for testing, commodity, IEC, STI management. Unit cost for FSW is not available from the shared best practice carried out by Contech International, thus we applied fast-track unit cost for FSW and discounting 50% cost of lubricant. In regards to ART unit cost, we used unit cost of business as usual scenario, then excluding CD4 count test (keeping the one time initial CD4 test only), and adding cost for link to care and adherence support. See section 2.2 for description of intervention package that corresponding to the below unit costs.
Effectiveness Parameters

Assumptions for behavior change and STI reduction, as an impact of interventions were based on:

- FSW: Experience shared by Contech International and consensus with TWG
- PWID: IBBS results in Karachi where the best practice PWID intervention was conducted.
- MSW/HSW: M&E system from Dostana
- ART-related infectivity reduction: Apply AEM modelling built-in parameters

After considering about the current gaps of current intervention and possibility to improve performance, we adjusted the effectiveness parameter as the table below:

Table 14. Assumptions for effective parameter of High Impact Scenario

<table>
<thead>
<tr>
<th>Program</th>
<th>Change in Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSEP</td>
<td>Percent IDUs sharing:</td>
</tr>
<tr>
<td></td>
<td>- Punjab: Baseline → 16.6%</td>
</tr>
<tr>
<td></td>
<td>- Sindh: Baseline → 17.1%</td>
</tr>
<tr>
<td></td>
<td>- KPK&amp;Bal.: Baseline → 21.9%</td>
</tr>
<tr>
<td></td>
<td>Percent injections shared: 50% → 30%</td>
</tr>
<tr>
<td></td>
<td>Number of injection per day: 2.7 → 2</td>
</tr>
<tr>
<td>FSW</td>
<td>Condom use w/Clients: Baseline → 80%</td>
</tr>
<tr>
<td></td>
<td>Condom use w/IDU: Baseline → 80%</td>
</tr>
<tr>
<td></td>
<td>Condom use w/MSM: Baseline → 80%</td>
</tr>
<tr>
<td></td>
<td>STI prevalence: Reduced by 0.37 times from baseline</td>
</tr>
<tr>
<td>MSM</td>
<td>Frequency of Anal Sex: Reduce by 0.87 times of baseline</td>
</tr>
<tr>
<td></td>
<td>Condom Use: Increased by 2.43 times of baseline or 85%</td>
</tr>
<tr>
<td></td>
<td>STI Prevalence:</td>
</tr>
<tr>
<td></td>
<td>- MSM clients: Reduced from 2.5% to 1.5% (Punjab), 9.5% to 4% (Sindh), 2% to 1% (KPK&amp;Bal)</td>
</tr>
<tr>
<td></td>
<td>- Non-paying MSM: Reduced by 0.84 times of baseline (Punjab), from 2.5% to 1.5% (Sindh), 0.5% to 0.3% (KPK&amp;Bal)</td>
</tr>
<tr>
<td></td>
<td>- MSW: Reduced from 10% to 4% (Punjab), from 15% to 5% (Sindh), 7% to 2% (KPK&amp;Bal)</td>
</tr>
<tr>
<td>TGSW</td>
<td>Frequency of Anal Sex: no change</td>
</tr>
<tr>
<td></td>
<td>Condom Use: Baseline → 80% - 85%</td>
</tr>
<tr>
<td></td>
<td>STI Prevalence: Reduced from 9.8% to 4% (Punjab), 12.2% to 5% (Sindh), 9.2% to 3% (KPK&amp;Bal)</td>
</tr>
<tr>
<td>ART-related infectivity reduction</td>
<td>90%, Treat all from 2018</td>
</tr>
</tbody>
</table>

See Annex B.5. for details.
3. High Impact with OST Scenario

This scenario used the same assumptions as that of High Impact Without OST Scenario. The only adding component is the OST coverage, unit cost and effectiveness.

Coverage

Table 15. Coverage target of NEP and OST for the High Impact Scenario

<table>
<thead>
<tr>
<th></th>
<th>2016 (baseline)</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Punjab</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEP</td>
<td>30%</td>
<td>35%</td>
<td>40%</td>
<td>45%</td>
<td>50%</td>
<td>55%</td>
<td>60%</td>
</tr>
<tr>
<td>OST</td>
<td>0%</td>
<td>3%</td>
<td>6%</td>
<td>9%</td>
<td>12%</td>
<td>15%</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Sindh</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEP</td>
<td>18%</td>
<td>22%</td>
<td>25%</td>
<td>29%</td>
<td>32%</td>
<td>36%</td>
<td>60%</td>
</tr>
<tr>
<td>OST</td>
<td>0%</td>
<td>2%</td>
<td>5%</td>
<td>7%</td>
<td>10%</td>
<td>12%</td>
<td>20%</td>
</tr>
<tr>
<td><strong>KPK &amp; Balochistan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEP</td>
<td>2.5%</td>
<td>10%</td>
<td>17%</td>
<td>25%</td>
<td>32%</td>
<td>40%</td>
<td>50%</td>
</tr>
<tr>
<td>OST</td>
<td>0%</td>
<td>2%</td>
<td>4%</td>
<td>6%</td>
<td>8%</td>
<td>10%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Unit cost

We review unit costs for OST in Asian countries. Four studies in 2009 indicates that the unit cost for OST is 352 USD (average of 4 studies).


The TWG decided to use the 2015 unit cost.

Effectiveness parameter for OST

Effective parameter was developed using results of the Evaluation of a pilot drug dependence treatment and care programme for people affected by heroin dependence among 210 PWID enrolled in the study in Rawalpindi in 2013. This is the only pilot program on OST implemented in Pakistan so far.
Table 16. Assumptions for effective parameter on OST for the High Impact Scenario

<table>
<thead>
<tr>
<th>Province</th>
<th>Change in Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab</td>
<td>Best practice achieved: 21%</td>
</tr>
<tr>
<td></td>
<td>Percent of sharing: Baseline → 3%</td>
</tr>
<tr>
<td></td>
<td>Percent injections shared: Baseline → 3%</td>
</tr>
<tr>
<td></td>
<td>Number of injection per day: 2.7 → 0.1</td>
</tr>
<tr>
<td>Sindh</td>
<td>Best practice achieved: 21%</td>
</tr>
<tr>
<td></td>
<td>Percent of sharing: Baseline → 5%</td>
</tr>
<tr>
<td></td>
<td>Percent injections shared: Baseline → 5%</td>
</tr>
<tr>
<td></td>
<td>Number of injection per day: 2.7 → 0.1</td>
</tr>
<tr>
<td>KPK and Balochistan</td>
<td>Best practice achieved: 21%</td>
</tr>
<tr>
<td></td>
<td>Percent of sharing: Baseline → 12%</td>
</tr>
<tr>
<td></td>
<td>Percent injections shared: Baseline → 10%</td>
</tr>
<tr>
<td></td>
<td>Number of injection per day: 2.7 → 0.1</td>
</tr>
</tbody>
</table>

4. Fast Track Scenario

Description of intervention and unit cost

The Fast track scenario assumes that quality and effective interventions are put to scale to end AIDS epidemic as a public threat and that includes context appropriate and adequate commodity provided to KP through community, quality peer education outreach with increased frequency and effectiveness, STI referral and treatment through community outreach, community capacity building and community based testing, linkage to care and adherence support. Detail intervention package and cost calculation is presented in Annex B.6. The table below summarize key unit costs for each province.

Table 17. Unit costs for intervention for the Fast Track Scenario

<table>
<thead>
<tr>
<th>Key population</th>
<th>Punjab</th>
<th>Sindh</th>
<th>KPK &amp; Balochistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSW</td>
<td>141.6</td>
<td>110.9</td>
<td>147.4</td>
</tr>
<tr>
<td>PWID (NEP)</td>
<td>218.3</td>
<td>218.3</td>
<td>223.2</td>
</tr>
<tr>
<td>PWID (OST)</td>
<td>363</td>
<td>363</td>
<td>363</td>
</tr>
<tr>
<td>MSM</td>
<td>124.9</td>
<td>100.6</td>
<td>144.7</td>
</tr>
<tr>
<td>MSW, HSW</td>
<td>146.4</td>
<td>123</td>
<td>167.2</td>
</tr>
<tr>
<td>Treatment¹</td>
<td>247</td>
<td>247</td>
<td>247</td>
</tr>
</tbody>
</table>

¹ This unit cost already took into account unit cost for the first line, second line and third line treatment. We assume that 5% of patients received 2nd line treatment and 0.3% received 3rd line treatment.
Program coverage target by year

Fast Track Scenario was developed using assumption that the country will reach 90-90-90 target by 2020. Coverage for the year in between 2016 and 2021 was interpolated. Target from 2020-2030 remains at the same level except the treatment target will gradually reach from 81% in 2020 to 90% in 2030. Coverage of the prevention and treatment intervention in Fast Track scenario is presented as below:

Table 18. Coverage intervention target of the Fast Track Scenario

<table>
<thead>
<tr>
<th></th>
<th>2016 (baseline)</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSW</td>
<td>10.5%</td>
<td>30%</td>
<td>50%</td>
<td>70%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>PWID – NEP</td>
<td>30%</td>
<td>38%</td>
<td>45%</td>
<td>53%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>PWID - OST</td>
<td>0%</td>
<td>8%</td>
<td>15%</td>
<td>23%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>MSW</td>
<td>13.6%</td>
<td>33%</td>
<td>52%</td>
<td>71%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>MSM clients</td>
<td>4.5%</td>
<td>26%</td>
<td>48%</td>
<td>69%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Non-paying MSM</td>
<td>1.5%</td>
<td>9%</td>
<td>16%</td>
<td>23%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>HSW</td>
<td>16.9%</td>
<td>35%</td>
<td>53%</td>
<td>72%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Treatment*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>8.1%</td>
<td>24%</td>
<td>43%</td>
<td>62%</td>
<td>81%</td>
<td>82%</td>
<td>90%</td>
</tr>
<tr>
<td>Women</td>
<td>25%</td>
<td>44%</td>
<td>62%</td>
<td>81%</td>
<td>82%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Sindh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSW</td>
<td>5.6%</td>
<td>27%</td>
<td>48%</td>
<td>69%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>PWID - NEP</td>
<td>7.5%</td>
<td>21%</td>
<td>34%</td>
<td>47%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>PWID - OST</td>
<td>0%</td>
<td>8%</td>
<td>15%</td>
<td>23%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>MSW</td>
<td>20.9%</td>
<td>38%</td>
<td>55%</td>
<td>73%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>MSM clients</td>
<td>7%</td>
<td>26%</td>
<td>48%</td>
<td>69%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Non-paying MSM</td>
<td>2.3%</td>
<td>8%</td>
<td>16%</td>
<td>23%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>HSW</td>
<td>22.2%</td>
<td>39%</td>
<td>56%</td>
<td>73%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Treatment*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>6.6%</td>
<td>23%</td>
<td>43%</td>
<td>62%</td>
<td>81%</td>
<td>82%</td>
<td>90%</td>
</tr>
<tr>
<td>Women</td>
<td>25%</td>
<td>44%</td>
<td>62%</td>
<td>81%</td>
<td>82%</td>
<td>90%</td>
<td>90%</td>
</tr>
</tbody>
</table>

KPK and
<table>
<thead>
<tr>
<th>Program</th>
<th>Change in Behavior</th>
</tr>
</thead>
</table>
| NSEP             | Best practice achieved: 50%  
Percent IDUs sharing:  
- Punjab: Baseline → 10%  
- Sindh: Baseline → 10%  
- KPK&Bal.: Baseline → 10%  
Percent injections shared: 50% → 10%  
Number of injection per day: 2.7 → 1 |
| OST              | Best practice achieved: 21%  
Percent of sharing: Baseline → 3%  
Percent injections shared: Baseline → 3%  
Number of injection per day: 2.7 → 0.1 |
| FSW              | Best practice achieved: 90%  
Condom use w/Clients: Baseline → 90%  
Condom use w/IDU: Baseline → 90%  
Condom use w/MSM: Baseline → 90%  
STI prevalence: Reduce to 1% in Punjab and KPK & Balochistan, 2% in Sindh |
| MSW              | Best practice achieved: 90%  
Frequency of Anal Sex: no change  
Condom Use: 90%  
STI Prevalence:  
- Reduce from 10% to 2% (Punjab) 15% to 3% (Sindh), 7% to 2% (KPK&Bal) |
| MSM Clients      | Best practice achieved: 90%  
Frequency of anal sex: No change |

**Effectiveness Parameters**

Table 19. Assumptions for effectiveness parameter of the Fast Track Scenario

<table>
<thead>
<tr>
<th>Program</th>
<th>Change in Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Balochistan</strong></td>
<td></td>
</tr>
<tr>
<td>FSW</td>
<td>1% 23% 46% 68% 90% 90% 90%</td>
</tr>
<tr>
<td>PWID – NEP</td>
<td>2.5% 17% 31% 46% 60% 60% 60%</td>
</tr>
<tr>
<td>PWID - OST</td>
<td>0% 8% 15% 23% 30% 30% 30%</td>
</tr>
<tr>
<td>MSW</td>
<td>1.5% 24% 46% 68% 90% 90% 90%</td>
</tr>
<tr>
<td>MSM clients</td>
<td>0.5% 24% 46% 68% 90% 90% 90%</td>
</tr>
<tr>
<td>Non-paying MSM</td>
<td>0.17% 9% 16% 23% 30% 30% 30%</td>
</tr>
<tr>
<td>HSW</td>
<td>1.2% 23% 46% 68% 90% 90% 90%</td>
</tr>
<tr>
<td>Treatment*</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>36.1% 39% 53% 67% 81% 82% 90%</td>
</tr>
<tr>
<td>Women</td>
<td>42% 55% 68% 81% 82% 90%</td>
</tr>
</tbody>
</table>

**Program**

<table>
<thead>
<tr>
<th><strong>Program</strong></th>
<th><strong>Change in Behavior</strong></th>
</tr>
</thead>
</table>
| NSEP        | Best practice achieved: 50%  
Percent IDUs sharing:  
- Punjab: Baseline → 10%  
- Sindh: Baseline → 10%  
- KPK&Bal.: Baseline → 10%  
Percent injections shared: 50% → 10%  
Number of injection per day: 2.7 → 1 |
| OST         | Best practice achieved: 21%  
Percent of sharing: Baseline → 3%  
Percent injections shared: Baseline → 3%  
Number of injection per day: 2.7 → 0.1 |
| FSW         | Best practice achieved: 90%  
Condom use w/Clients: Baseline → 90%  
Condom use w/IDU: Baseline → 90%  
Condom use w/MSM: Baseline → 90%  
STI prevalence: Reduce to 1% in Punjab and KPK & Balochistan, 2% in Sindh |
| MSW         | Best practice achieved: 90%  
Frequency of Anal Sex: no change  
Condom Use: 90%  
STI Prevalence:  
- Reduce from 10% to 2% (Punjab) 15% to 3% (Sindh), 7% to 2% (KPK&Bal) |
| MSM Clients  | Best practice achieved: 90%  
Frequency of anal sex: No change |
Results

1. Baseline Model outputs

The session below presented key output of the baseline AEM model for each province.

Punjab – Baseline AEM output

Tables and figures below summarize the key outputs from Punjab baseline model in 2016 and estimation till 2030 if intervention remains at current level. According to the estimation, there are an estimated 68,750 adults living with HIV with an estimated 9,401 new infections and 4,322 deaths occurred among adults in Punjab in 2017. Number of current infections increased by 1.6 folds in 2021, in comparison to that of 2016. The HIV prevalence among adults is still low – around 0.1% during 2016-2021. The epidemic is concentrated among key populations including PWID, MSM, MSW, TGSW, and FSW. In 2016, PWID still accounts for high proportion of new HIV infections, but the trend of new infections tends to remain stable in the years after. The HIV epidemic is increasing substantially among MSM and MSW. The annual AIDS-related deaths will be almost doubled in 2021 as compared to 2016.

Table 20. Summary of Baseline AEM output for Punjab

<table>
<thead>
<tr>
<th>Key indicators</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current PLHIVs</td>
<td>63,671</td>
<td>68,750</td>
<td>74,662</td>
<td>81,889</td>
<td>90,494</td>
<td>100,651</td>
</tr>
<tr>
<td>New HIV infections</td>
<td>9,199</td>
<td>9,401</td>
<td>10,774</td>
<td>12,287</td>
<td>14,081</td>
<td>16,304</td>
</tr>
<tr>
<td>Annual AIDS-related deaths</td>
<td>3,914</td>
<td>4,322</td>
<td>4,861</td>
<td>5,060</td>
<td>5,476</td>
<td>6,146</td>
</tr>
<tr>
<td>HIV prevalence among adults</td>
<td>0.09%</td>
<td>0.09%</td>
<td>0.1%</td>
<td>0.11%</td>
<td>0.11%</td>
<td>0.12%</td>
</tr>
</tbody>
</table>
Figure 1. HIV prevalence among adults in Punjab, 2016-2030, AEM Baseline model

Figure 2. Annual new infection by risk populations in Punjab, 2016-2030, AEM Baseline model
Figure 3. Distribution of new infection in 2016 in Punjab, AEM Baseline model

![Pie chart showing distribution of new HIV infections by sub-population in 2016.]

Total 9,054 infections

- Male IDU: 29%
- LR Women: 22%
- MSM: 20%
- MSW: 8%
- LR Males: 13%
- TG: 3%
- FSW: 1%
- Clients: 4%

Figure 4. AIDS related deaths in Punjab, 2016-2030, AEM Baseline model

![Line graph showing AIDS-related deaths from 1980 to 2030.]

- Adult male (15+)
- Adult female (15+)
- Total adults (15+)
Tables and figures below summarize the key outputs from Sindh baseline model in 2016 and estimation till 2030 if intervention remains at current level. According to the estimation, there are an estimated 58,634 adults living with HIV with an estimated 7,760 new infections and 4,017 deaths occurred among adults in Sindh in 2017. Number of current infection increased by 1.4 folds in 2021, in comparison to that of 2016. The HIV prevalence among adults is still low – around 0.2% during 2016-2021, but higher than that in Punjab. The epidemic is concentrated among key populations including PWID, MSM, MSW, TGSW, and FSW. In 2016, PWID still accounts for high proportion of new HIV infections, but the trend of new infections tends to remain stable in the years after. The HIV epidemic is increasing rapidly, particularly among MSM. AIDS-related deaths are also increasing.

Table 21. Summary of Baseline AEM output for Sindh

<table>
<thead>
<tr>
<th>Key indicators</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current PLHIVs</td>
<td>54,891</td>
<td>58,634</td>
<td>62,444</td>
<td>66,375</td>
<td>70,441</td>
<td>74,666</td>
</tr>
<tr>
<td>New HIV infections</td>
<td>7,550</td>
<td>7,760</td>
<td>8,213</td>
<td>8,689</td>
<td>9,184</td>
<td>9,698</td>
</tr>
<tr>
<td>Annual AIDS-related deaths</td>
<td>3,680</td>
<td>4,017</td>
<td>4,402</td>
<td>4,758</td>
<td>5,117</td>
<td>5,474</td>
</tr>
<tr>
<td>HIV prevalence among adults</td>
<td>0.18%</td>
<td>0.19%</td>
<td>0.20%</td>
<td>0.21%</td>
<td>0.22%</td>
<td>0.23%</td>
</tr>
</tbody>
</table>
Figure 6. HIV prevalence among adults in Sindh, 2016-2030, AEM Baseline model

Figure 7. Annual new infections by risk populations in Sindh, 2016-2030, AEM Baseline model
Figure 8. Distribution of new infections in 2016 in Sindh, AEM Baseline model

Figure 9. AIDS related deaths in Sindh, 2016-2030, AEM Baseline model
Tables and figures below summarize the key outputs from KPK and Balochistan baseline model in 2016 and estimation till 2030 if intervention remains at current level. According to the estimation, there are an estimated 11,565 adults living with HIV with an estimated 1,984 new infections and 338 deaths occurred among adults in KPK and Balochistan in 2017. The HIV prevalence among adults is still low – around 0.04 - 0.08% during 2016-2021. The epidemic is concentrated key populations including PWID, MSM, MSW, TGSW, and FSW. In 2016, PWID still accounts for high proportion of new HIV infections, but the trend of new infections tends to remain stable in the years after. The HIV epidemic is increasing significantly, particularly among MSM. Annual AIDS-related deaths are increasing and HIV disease burden in KP and Balochistan will be almost doubled in 2021 as compared to 2016.

Table 22. Summary of Baseline AEM output for KPK and Balochistan

<table>
<thead>
<tr>
<th>Key indicators</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current PLHIVs</td>
<td>9,919</td>
<td>11,565</td>
<td>13,345</td>
<td>15,214</td>
<td>17,165</td>
<td>19,233</td>
</tr>
<tr>
<td>New HIV infections</td>
<td>1,756</td>
<td>1,984</td>
<td>2,193</td>
<td>2,290</td>
<td>2,366</td>
<td>2,577</td>
</tr>
<tr>
<td>Annual AIDS-related deaths</td>
<td>282</td>
<td>338</td>
<td>412</td>
<td>421</td>
<td>414</td>
<td>509</td>
</tr>
<tr>
<td>HIV prevalence among adults</td>
<td>0.04%</td>
<td>0.05%</td>
<td>0.06%</td>
<td>0.06%</td>
<td>0.07%</td>
<td>0.08%</td>
</tr>
</tbody>
</table>
Figure 11. HIV prevalence among adults in KPK & Balochistan, 2016-2030, AEM Baseline model

Figure 12. Annual new infections by risk populations in KPK & Balochistan 2016-2030, AEM Baseline model
Figure 13. Distribution of new infections in 2016 in KPK & Balochistan, AEM Baseline model

Figure 14. AIDS related deaths in KPK & Balochistan, 2016-2030, AEM Baseline model
Pakistan national level – Baseline AEM output

Tables and figures below summarize the key outputs from Pakistan national level baseline model in 2016 and estimation till 2030 if intervention remains at current level. According to the estimation, there are an estimated 139,000 adults living with HIV with an estimated 19,000 new infections and 8,700 deaths occurred among adults in Pakistan in 2017. Number of current infections increased by nearly 1.5 folds in 2021, in comparison to that of 2016. The HIV prevalence among adults is still low – around 0.1 - 0.14% during 2016-2021. The epidemic is concentrated among key populations including PWID, MSM, MSW, TGSW, and FSW. In 2016, PWID still accounts for high proportion of new HIV infections, but the new infections trend tends to remain stable in the years after. The HIV epidemic is increasing rapidly, particularly among MSM. Annual AIDS-related deaths are also increasing.

Table 23. Summary of Baseline AEM output for Pakistan – national level

<table>
<thead>
<tr>
<th>Key indicators</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current PLHIVs</td>
<td>128,480</td>
<td>138,942</td>
<td>150,330</td>
<td>162,985</td>
<td>177,318</td>
<td>193,635</td>
</tr>
<tr>
<td>New HIV infections</td>
<td>18,504</td>
<td>19,151</td>
<td>21,015</td>
<td>23,122</td>
<td>25,775</td>
<td>28,767</td>
</tr>
<tr>
<td>Annual AIDS-related deaths</td>
<td>7,876</td>
<td>8,689</td>
<td>9,627</td>
<td>10,467</td>
<td>11,442</td>
<td>12,450</td>
</tr>
<tr>
<td>HIV prevalence among adults</td>
<td>0.1%</td>
<td>0.11%</td>
<td>0.12%</td>
<td>0.12%</td>
<td>0.13%</td>
<td>0.14%</td>
</tr>
</tbody>
</table>
Figure 16. HIV prevalence among adults in Pakistan – national level, 2016-2030, AEM Baseline model

Figure 17. Annual new infections by risk populations in Pakistan 2016-2030, AEM Baseline model
Figure 18. Distribution of new infections in 2016 in Pakistan, AEM Baseline model

![Pie chart showing distribution of new HIV infections in 2016 in Pakistan, with Male IDU 29%, MSM 21%, LR Males 13%, LR Women 19%, MSW 7%, TG 3%, FSW 2%, and Clients 6%.]

Figure 19. AIDS related deaths in Pakistan, 2016-2030, AEM Baseline model

![Line graph showing AIDS-related deaths from 1990 to 2030 for Adult male (15+), Adult female (15+), and Total adults (15+).]
2. **Future intervention scenario analysis**

This section presents the analysis of four intervention scenarios for each province. The four scenarios include: (1) Business as Usual Scenario, (2) High Impact without OST, (3) High impact with OST, and (4) Fast-Track Scenario.

The output of intervention scenario analysis suggests that Fast-Track scenario would lead to substantial decline in new HIV infections and achieve the ending AIDS vision. The other two scenarios on high impact with or without OST, would also bring a significant reduction in new infections and total deaths.

Since OST is not likely to be supported and legalize in Pakistan in the near future, and the Fast Track scenario needs extensive frontloading of investment and thus it is not pragmatic with current Pakistan funding landscape. Hence, the TWG discussed and selected the High Impact Scenario (without OST) for the strategic plan of the HIV program in all provinces.

To implement this High Impact Scenario (without OST), it is required to allocate a total of 265 million USD during the period 2016-2021 (or 1.25 billion USD during 2016-2030) for the whole country. Among those, 127 million USD should be invested for Punjab (48%), 111 million USD should be invested for Sindh (42%), and 27 million USD should be invested for KPK and Balochistan. Targets for high impact scenario is presented in the section 2 above. At national level, total of 370,000 HIV infections will be averted and 145,400 life saved during 2016-2030, saving 6.9 million Disability-Adjusted Life Years (DALYs) or USD 10.7 billion in economic terms. Or in other words, if the country invest 1 USD today for HIV program to prevent new infection and death, the country will earn 8.6 USD in 2030.

Section below presents key data output of the policy scenarios analysis.
Punjab – comparison of four policy scenarios

Figure 21. New infections trend among all adults of 4 intervention scenarios in Punjab, 2016-2030

Figure 22. AIDS-related deaths among all adults of 4 intervention scenarios in Punjab, 2016-2030
Figure 23. New HIV infections among male PWID in Punjab, 2016-2030, comparison of Business as Usual, High Impact with and without OST

Table 24. Total resources, # of DALY saved, cost per DALY saved of 4 policy scenarios for Punjab (2016-2021)

<table>
<thead>
<tr>
<th>Resource Needs Required:</th>
<th>Baseline</th>
<th>High impact no OST</th>
<th>High impact with OST</th>
<th>Fast track</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention Cost (thousands)</td>
<td>$31,595</td>
<td>$94,906</td>
<td>$98,194</td>
<td>$192,621</td>
</tr>
<tr>
<td>Treatment Cost (thousands)</td>
<td>$7,204</td>
<td>$31,968</td>
<td>$31,375</td>
<td>$46,676</td>
</tr>
<tr>
<td>Prevention Cost (thousands, discounted)</td>
<td>$28,487</td>
<td>$83,711</td>
<td>$86,575</td>
<td>$169,431</td>
</tr>
<tr>
<td>Treatment Cost (thousands, discounted)</td>
<td>$6,386</td>
<td>$27,875</td>
<td>$27,368</td>
<td>$40,669</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Epidemiological Outcomes:</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative new HIV infections</td>
<td>72,045</td>
<td>46,694</td>
<td>44,204</td>
<td>32,220</td>
</tr>
<tr>
<td>Cumulative AIDS-related deaths</td>
<td>29,780</td>
<td>19,057</td>
<td>19,046</td>
<td>14,996</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marginal Resources Required:</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional Prevention Cost (thousands)</td>
<td>$63,310</td>
<td>$66,599</td>
<td>$161,025</td>
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</tr>
<tr>
<td>Additional Treatment Cost (thousands)</td>
<td>$24,764</td>
<td>$24,170</td>
<td>$39,472</td>
<td></td>
</tr>
<tr>
<td>Additional Prevention Cost (thousands, discounted)</td>
<td>$55,223</td>
<td>$58,087</td>
<td>$140,944</td>
<td></td>
</tr>
<tr>
<td>Additional Treatment Cost (thousands, discounted)</td>
<td>$21,489</td>
<td>$20,982</td>
<td>$34,283</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Epidemiological Impacts</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total HIV Infections Averted</td>
<td>25,351</td>
<td>27,841</td>
<td>39,825</td>
<td></td>
</tr>
<tr>
<td>Total Lives Saved (Deaths Averted)</td>
<td>10,701</td>
<td>10,709</td>
<td>14,754</td>
<td></td>
</tr>
<tr>
<td>Total DALYs Saved (thousands)</td>
<td>502</td>
<td>505</td>
<td>708</td>
<td></td>
</tr>
<tr>
<td>Total DALYs Saved (thousands, discounted)</td>
<td>436</td>
<td>438</td>
<td>614</td>
<td></td>
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</tbody>
</table>
Cost-Effectiveness Analyses

<table>
<thead>
<tr>
<th>Cost per DALY saved (total cost)</th>
<th>$252.63</th>
<th>$256.80</th>
<th>$338.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per DALY saved (marginal costs)</td>
<td>$175.38</td>
<td>$179.90</td>
<td>$283.28</td>
</tr>
<tr>
<td>Cost per DALY saved (total cost, discounted)</td>
<td>$256.20</td>
<td>$260.40</td>
<td>$341.91</td>
</tr>
<tr>
<td>Cost per DALY saved (marginal costs, discounted)</td>
<td>$176.13</td>
<td>$180.70</td>
<td>$285.16</td>
</tr>
</tbody>
</table>

| Total Savings in Treatment Costs (thousands) | -$24,764 | -$24,170 | -$39,472 |
| Total Savings in Treatment Costs ('000, discounted) | -$21,489 | -$20,982 | -$34,283 |

Sindh – comparison of four policy scenarios

Figure 24. New infections trend among all adults of 4 intervention scenarios in Sindh, 2016-2030

Figure 25. AIDS-related deaths among all adults of 4 intervention scenarios in Sindh, 2016-2030
Figure 26. New infections among male PWID in Sindh, 2016-2030, comparison of Business as Usual, High Impact with and without OST

Table 25. Total resources, # of DALY saved, cost per DALY saved of 4 policy scenarios for Sindh (2016-2021)

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>High impact no OST</th>
<th>High impact with OST</th>
<th>Fast track</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resource Needs Required:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention Cost (thousands)</td>
<td>$14,485</td>
<td>$92,409</td>
<td>$94,715</td>
<td>$146,896</td>
</tr>
<tr>
<td>Treatment Cost (thousands)</td>
<td>$3,361</td>
<td>$19,067</td>
<td>$18,903</td>
<td>$38,306</td>
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<tr>
<td>Prevention Cost (thousands, discounted)</td>
<td>$13,059</td>
<td>$81,201</td>
<td>$83,204</td>
<td>$128,872</td>
</tr>
<tr>
<td>Treatment Cost (thousands, discounted)</td>
<td>$3,015</td>
<td>$16,658</td>
<td>$16,518</td>
<td>$33,370</td>
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<tr>
<td><strong>Epidemiological Outcomes:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative new HIV infections</td>
<td>51,093</td>
<td>35,407</td>
<td>34,416</td>
<td>24,343</td>
</tr>
<tr>
<td>Cumulative AIDS-related deaths</td>
<td>27,448</td>
<td>19,272</td>
<td>19,280</td>
<td>13,558</td>
</tr>
<tr>
<td><strong>Marginal Resources Required:</strong></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Additional Prevention Cost (thousands)</td>
<td>$77,924</td>
<td>$80,230</td>
<td>$132,411</td>
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<tr>
<td>Additional Treatment Cost (thousands)</td>
<td>$15,705</td>
<td>$15,542</td>
<td>$34,944</td>
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<tr>
<td>Additional Prevention Cost (thousands, discounted)</td>
<td>$68,142</td>
<td>$70,144</td>
<td>$115,812</td>
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<tr>
<td>Additional Treatment Cost (thousands, discounted)</td>
<td>$13,643</td>
<td>$13,503</td>
<td>$30,355</td>
<td></td>
</tr>
<tr>
<td><strong>Epidemiological Impacts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total HIV Infections Averted</td>
<td>15,687</td>
<td>16,677</td>
<td>26,750</td>
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</tr>
<tr>
<td>Total Lives Saved (Deaths Averted)</td>
<td>8,158</td>
<td>8,149</td>
<td>13,866</td>
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<tr>
<td>Total DALYs Saved (thousands)</td>
<td>369</td>
<td>369</td>
<td>640</td>
<td></td>
</tr>
<tr>
<td>Total DALYs Saved (thousands, discounted)</td>
<td>320</td>
<td>320</td>
<td>556</td>
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</table>
## Cost-Effectiveness Analyses

<table>
<thead>
<tr>
<th>Cost per DALY saved (total cost)</th>
<th>$302.43</th>
<th>$307.79</th>
<th>$289.18</th>
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<tbody>
<tr>
<td>Cost per DALY saved (marginal costs)</td>
<td>$254.01</td>
<td>$259.44</td>
<td>$261.32</td>
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<tr>
<td>Cost per DALY saved (total cost, discounted)</td>
<td>$305.89</td>
<td>$311.26</td>
<td>$291.58</td>
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<tr>
<td>Cost per DALY saved (marginal costs, discounted)</td>
<td>$255.64</td>
<td>$261.09</td>
<td>$262.69</td>
</tr>
</tbody>
</table>

Total Savings in Treatment Costs (thousands)

- $15,705
- $15,542
- $34,944

Total Savings in Treatment Costs (‘000, discounted)

- $13,643
- $13,503
- $30,355

## KPK and Balochistan – comparison of four policy scenarios

Figure 27. New infections trend of 4 intervention scenarios in KPK & Balochistan, 2016-2030

Figure 28. AIDS-related deaths among all adults of 4 intervention scenarios in KPK & Balochistan, 2016-2030
Figure 29. New HIV infections among male PWID in KPK & Balochistan, 2016-2030, comparison of Business as Usual, High Impact with and without OST

Table 26. Total resources, # of DALY saved, cost per DALY saved of 4 policy scenarios for KPK and Balochistan (2016-2021)

<table>
<thead>
<tr>
<th>Resource Needs Required:</th>
<th>Baseline</th>
<th>High impact no OST</th>
<th>High impact with OST</th>
<th>Fast track</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention Cost (thousands)</td>
<td>$855</td>
<td>$19,825</td>
<td>$20,239</td>
<td>$74,059</td>
</tr>
<tr>
<td>Treatment Cost (thousands)</td>
<td>$5,844</td>
<td>$7,217</td>
<td>$7,181</td>
<td>$10,545</td>
</tr>
<tr>
<td>Prevention Cost (thousands, discounted)</td>
<td>$771</td>
<td>$17,290</td>
<td>$17,651</td>
<td>$64,753</td>
</tr>
<tr>
<td>Treatment Cost (thousands, discounted)</td>
<td>$5,172</td>
<td>$6,400</td>
<td>$6,369</td>
<td>$9,269</td>
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</table>

<table>
<thead>
<tr>
<th>Epidemiological Outcomes:</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative new HIV infections</td>
<td>13,166</td>
<td>11,240</td>
<td>11,044</td>
<td>8,321</td>
</tr>
<tr>
<td>Cumulative AIDS-related deaths</td>
<td>2,378</td>
<td>2,164</td>
<td>2,164</td>
<td>1,569</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marginal Resources Required:</th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional Prevention Cost (thousands)</td>
<td></td>
<td>$18,970</td>
<td>$19,384</td>
<td>$73,204</td>
</tr>
<tr>
<td>Additional Treatment Cost (thousands)</td>
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<td>$1,373</td>
<td>$1,337</td>
<td>$4,702</td>
</tr>
<tr>
<td>Additional Prevention Cost (thousands, discounted)</td>
<td></td>
<td>$16,520</td>
<td>$16,881</td>
<td>$63,983</td>
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<tr>
<td>Additional Treatment Cost (thousands, discounted)</td>
<td></td>
<td>$1,229</td>
<td>$1,198</td>
<td>$4,098</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Epidemiological Impacts</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total HIV Infections Averted</td>
<td>1,926</td>
<td>2,121</td>
<td>4,844</td>
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</tr>
<tr>
<td>Total Lives Saved (Deaths Averted)</td>
<td>212</td>
<td>211</td>
<td>804</td>
<td></td>
</tr>
<tr>
<td>Total DALYs Saved (thousands)</td>
<td>11</td>
<td>11</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>Total DALYs Saved (thousands, discounted)</td>
<td>10</td>
<td>10</td>
<td>38</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost-Effectiveness Analyses</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per DALY saved (total cost)</td>
<td>$2,404.46</td>
<td>$2,395.64</td>
<td>$1,904.13</td>
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</tr>
</tbody>
</table>
Cost per DALY saved (marginal costs) $1,808.82 $1,810.38 $1,753.36
Cost per DALY saved (total cost, discounted) $2,377.77 $2,370.50 $1,924.91
Cost per DALY saved (marginal costs, discounted) $1,781.34 $1,784.06 $1,770.38
Total Savings in Treatment Costs (thousands) -$1,373 -$1,337 -$4,702
Total Savings in Treatment Costs (’000, discounted) -$1,229 -$1,198 -$4,098

Pakistan (National level) – comparison of four policy scenarios

Figure 30. New infections trend of 4 intervention scenarios in Pakistan, 2016-2030

![Figure 30](image)

Figure 31. AIDS-related deaths among all adults of 4 intervention scenarios in Pakistan, 2016-2030

![Figure 31](image)
Figure 32. New HIV infections among male PWID in Pakistan, 2016-2030, comparison of Business as Usual, High Impact with and without OST
Table 27. Total resources, # of DALY saved, cost per DALY saved of 4 policy scenarios for Pakistan (2016-2021)

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>High impact no OST</th>
<th>High impact with OST</th>
<th>Fast track</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resource Needs Required:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention Cost (thousands)</td>
<td>$46,936</td>
<td>$207,140</td>
<td>$213,148</td>
<td>$413,576</td>
</tr>
<tr>
<td>Treatment Cost (thousands)</td>
<td>$16,409</td>
<td>$58,251</td>
<td>$57,459</td>
<td>$95,527</td>
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<tr>
<td>Prevention Cost (thousands, discounted)</td>
<td>$42,317</td>
<td>$182,202</td>
<td>$187,430</td>
<td>$363,056</td>
</tr>
<tr>
<td>Treatment Cost (thousands, discounted)</td>
<td>$14,572</td>
<td>$50,933</td>
<td>$50,256</td>
<td>$83,308</td>
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<tr>
<td><strong>Epidemiological Outcomes:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative new HIV infections</td>
<td>136,304</td>
<td>93,341</td>
<td>89,665</td>
<td>64,885</td>
</tr>
<tr>
<td>Cumulative AIDS-related deaths</td>
<td>59,605</td>
<td>40,493</td>
<td>40,490</td>
<td>30,123</td>
</tr>
<tr>
<td><strong>Marginal Resources Required:</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Additional Prevention Cost (thousands)</td>
<td>$160,204</td>
<td>$166,213</td>
<td>$366,641</td>
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</tr>
<tr>
<td>Additional Treatment Cost (thousands)</td>
<td>$41,842</td>
<td>$41,050</td>
<td>$79,118</td>
<td></td>
</tr>
<tr>
<td>Additional Prevention Cost (thousands, discounted)</td>
<td>$139,885</td>
<td>$145,112</td>
<td>$320,738</td>
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</tr>
<tr>
<td>Additional Treatment Cost (thousands, discounted)</td>
<td>$36,361</td>
<td>$35,683</td>
<td>$68,736</td>
<td></td>
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<tr>
<td><strong>Epidemiological Impacts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total HIV Infections Averted</td>
<td>42,963</td>
<td>46,639</td>
<td>71,419</td>
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</tr>
<tr>
<td>Total Lives Saved (Deaths Averted)</td>
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<td>19,070</td>
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<tr>
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<td>885</td>
<td>1,393</td>
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<tr>
<td>Total DALYs Saved (thousands, discounted)</td>
<td>765</td>
<td>768</td>
<td>1,209</td>
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<tr>
<td><strong>Cost-Effectiveness Analyses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost per DALY saved (total cost)</td>
<td>$300.88</td>
<td>$305.72</td>
<td>$365.57</td>
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</tr>
<tr>
<td>Cost per DALY saved (marginal costs)</td>
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<td>$234.16</td>
<td>$320.08</td>
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<tr>
<td>Cost per DALY saved (total cost, discounted)</td>
<td>$304.58</td>
<td>$309.45</td>
<td>$369.09</td>
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<tr>
<td>Cost per DALY saved (marginal costs, discounted)</td>
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<td>$235.38</td>
<td>$322.05</td>
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</tr>
<tr>
<td>Total Savings in Treatment Costs (thousands)</td>
<td>-$41,842</td>
<td>-$41,050</td>
<td>-$79,118</td>
<td></td>
</tr>
<tr>
<td>Total Savings in Treatment Costs (thousands, discounted)</td>
<td>-$36,361</td>
<td>-$35,683</td>
<td>-$68,736</td>
<td></td>
</tr>
</tbody>
</table>