EVALUATING THE COST-EFFECTIVENESS OF NEEDLE-SYRINGE EXCHANGE PROGRAMS IN GEORGIA

2011 Report

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BACKGROUND

Sharing of syringes by people who inject drugs is an important mode of global transmission of blood-borne viruses, such as HIV and the hepatitis C virus (HCV) [1, 2]. HIV epidemics in Eastern Europe and Central Asia have particularly been driven by injecting drug use and Eastern Europe and Central Asia is the only region where HIV prevalence is clearly on the rise [3-5].

Both HIV and HCV infection are associated with significant morbidity and mortality [6, 7]. Needle-syringe exchange programs (NSEPs) are a public health measure designed to reduce the spread of these infections among people who inject drugs. NSEPs have been shown to be a safe and effective means to reduce HIV transmission in some developed and developing country settings [8-13]. There are large differences in the HIV epidemics in various international settings among people who inject drugs [1, 2, 14]. Ecological studies suggest that where NSEPs are not easily accessible, HIV prevalence tends to be substantially greater than in locations where NSEPs are available [12, 15-22]. In contrast to HIV infection, prevalence of HCV among people who inject drugs is generally high in all locations regardless of the existence of NSEPs [2].

NSEPs operate in many different modes in different contexts and they may provide a range of services that include the provision of injecting equipment, education and information on the reduction of drug-related harms, referral to drug treatment, medical care and legal and social services [23]. Equipment provided by NSEPs usually includes needle-syringes, swabs, sterile water, and sharps bins for the safe disposal of injecting equipment. The primary aim of NSEPs is to prevent the shared use of injecting equipment in order to reduce the risk of acquiring blood-borne infections among people who inject drugs. People who inject drugs are unlikely to use another person's syringes if they have convenient access to sterile needle-syringes [24, 25].

In Georgia, harm reduction services were introduced in late 1999-early 2000 and were supported by the Open Society Institute and its country office. The first institutionalized NSEPs were launched in Tbilisi and Batumi (Georgia) in 2001, involving both non-governmental organizations and state agencies. Namely, the NGO Sasoeba (Tbilisi) and the Public Health Department of the Ministry of

Health (MoH) of the Autonomous Republic of Ajaria (Batumi) pioneered needle and syringe programs with financial support from the Open Society-Georgia Foundation[26].

There are now nine such sites operating in all major cities across the country. All these programs are funded by a grant from the Global Fund to Fight AIDS, Malaria and Tuberculosis (GFATM) and operate as combined needle/syringe exchange sites and voluntary counselling and testing (VCT) centres. Services offered range from outreach, needle and syringe distribution, provision of medical, psychological care and legal consultations, to the distribution of condoms and information materials, and testing on HIV and viral hepatitis B/C.

HIV/AIDS effectiveness evaluation and cost-effectiveness studies have become important analytical tools to understand what HIV investments have bought, to determine whether the interventions averted new infections and AIDS deaths, and at what cost. They can support decision-making and the prioritization of intervention strategies and target groups within the HIV/AIDS response with its overall goals of minimising the burden of disease and maximising health outcomes.

This evaluation will assess whether the investment in NSEPs has had an impact on the transmission of blood-borne viruses in Georgia and whether or not the program outcomes represent good value for money. This study aimed to:

(1) Estimate the population benefits that NSEPs in Georgia have likely had in preventing HIV and HCV infections and related health outcomes among people who inject drugs;
(2) Calculate the cost-effectiveness of NSEPs in Georgia from a health sector perspective.

This evaluation was carried out using a standardized model and software package, first developed for evaluation of NSEPs in Australia [27] and adapted for general application to any setting in a joint collaboration between UNAIDS and the University of New South Wales; details of the Needle Exchange Program Evaluation Model (NEPEM) are available in the technical annex to this report. The application of this tool to evaluation of NSEPs in Georgia was conducted between UNAIDS, UNSW, and in-country partners, namely, Addiction Research Center (ARC) Alternative Georgia, Georgian Institute of Public Affairs (GIPA), and Country Coordinating Mechanism (CCM) of Georgia.

The NEPEM was directly informed by all available epidemiological, behavioral and economic data relevant to people who inject drugs in Georgia. The relationship between NSEPs and risk behavior specific to Georgia was used to define appropriate yet conservative counterfactual scenarios, that is, the assumed conditions that would likely have occurred had NSEPs not been in place. The

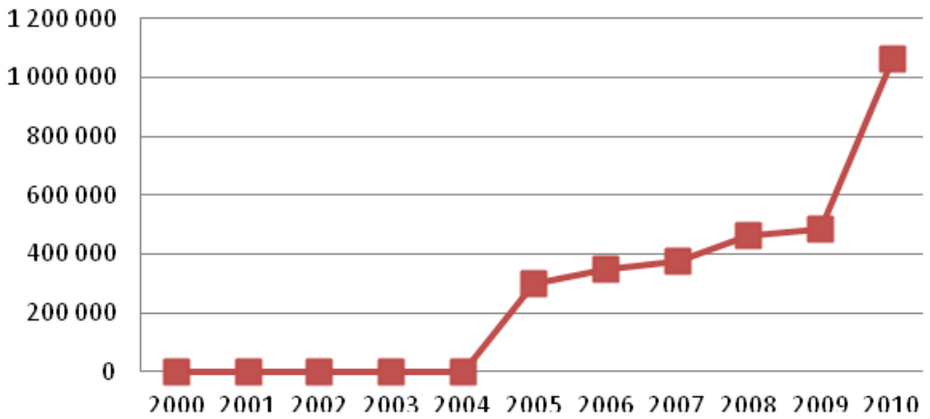
NEPEM (i) was calibrated to reflect historical epidemiological trends and (past and future) healthcare costs according to observed behaviors and practices and (ii) simulated epidemic trajectories and healthcare costs according to the defined counterfactual conditions. The difference in epidemiological outcomes and costs between scenarios (i) and (ii) defined the benefits/losses due to NSEPs. Resulting indicators were used to determine the net present value and future values, as well as the cost-effectiveness of NSEPs in Georgia and the time horizons over which the programs may be considered to have reached certain cost-effective/cost-savings thresholds. The NEPEM was also used to estimate the expected epidemiological and economic benefits associated with increases or decreases in NSEPs in Georgia over the next 10 years.

This report is based on the effectiveness of NSEPs in averting HIV and HCV infections among people who inject drugs only and not on the possible other benefits of NSEPs, such as averted mental health episodes and injection-related injury, psychosocial benefits, other support, referral, education and prevention, etc. Costs of NSEPs in this analysis did not include drug and alcohol programs, etc. and thus the results are conservative and underestimate the true return on investment. It needs to be noted that data on needles and syringes distributed and relevant financing were available only starting from 2004 (when the GFATM grant was launched), thus we did not include information for years 2000-2003 in the analysis.

DATA AND KEY ASSUMPTIONS FOR EVALUATION OF NSEPS IN GEORGIA

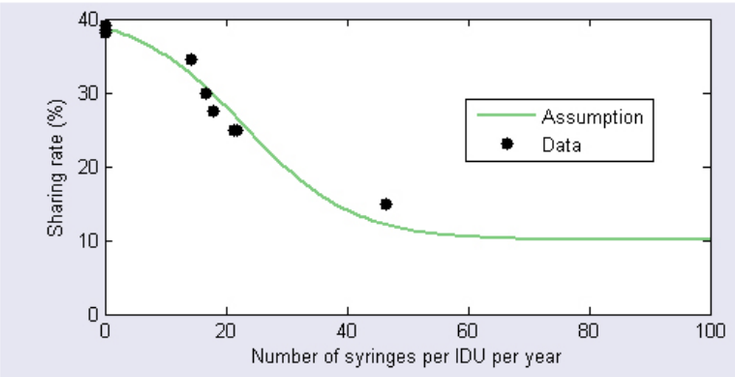
NSEPs can first be assessed in terms of the overall distribution of commodities to people who inject drugs. The trend in total number of needle-syringes distributed to people who inject drugs in Georgia is presented in Figure 1. The number of needles and syringes distributed has been steadily increasing in recent years. In 2010 slightly more than 1 mil needles-syringes were distributed throughout the country. The number of syringes available for distribution was directly related to the funding allocated for these programs in the country's GF grants and reflected the overall recognition of the importance of NSEP among Georgian stakeholders and decision-makers.The number of needle-syringes distributed per person who injects per year is probably a more appropriate measure of NSEP coverage. A nominal target of 'good coverage' is to attain a regular distribution of 200 sterile needle-syringes to each person who injects per year.

Figure 1. The number of needle-syringes distributed through NSPs in Georgia



The main objective of NSEPs is to reduce the incidence of blood-borne infections among people who inject drugs through a reduction in the sharing of injecting equipment. The relationship between reported sharing rates and the numbers of needle-syringes per person who injects per year highlights this crucial intermediate outcome between program and epidemiology. In Georgia, there is a clear relationship between reported sharing rates and the number of syringes distributed: sharing rates decrease as the number of needles and syringes distributed increase (Figure 2).

Figure 2. Relationship between reported sharing rates and per-capita distribution of needle-syringes in Georgia

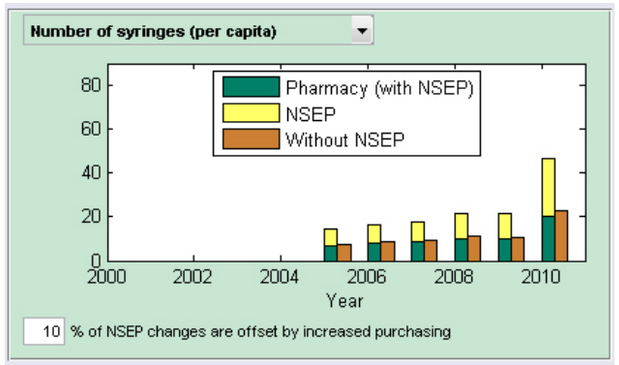


There is no evidence to suggest that the introduction of needle-syringe exchange programs has influenced the total number of IDUs in Georgia or the frequency at which they inject. There may have been an increase in the frequency of injecting over time. This is most likely associated with the shift to home-made meth/

amphetamine-type stimulants that has been observed in recent years in Georgia [28]. Stimulants have a remarkably shorter period of action than (traditional to Georgia) opioids, thus leading to significant increase in frequency of injections by Georgian people who inject drugs. It is worth noting that other factors may influence these relationships and any change may not necessarily imply causation.

The relationship between sharing rates and needle-syringe distribution by NSEPs (Figure 2) was used as a crucial assumption to define the counterfactual scenario as to what behavior would likely have been in the absence of NSEPs. However, it is plausible that in the absence of NSEPs there may have been an increase in the purchase of injecting equipment to offset the change caused by NSEPs. In this analysis, in the absence of NSEPs, a 10% increase in pharmacy purchasing to offset NSEP changes (Figure 3) with sensitivity analyses of [0% and 20%], was assumed. These expectations, coupled with the relationship in Figure 2, define the key assumptions of the evaluation exercise. It was assumed that NSEPs do not affect the total numbers of people who inject drugs or the frequency at which they inject.

Figure 3. Assumption about changes in pharmacy purchasing to offset NSEPs



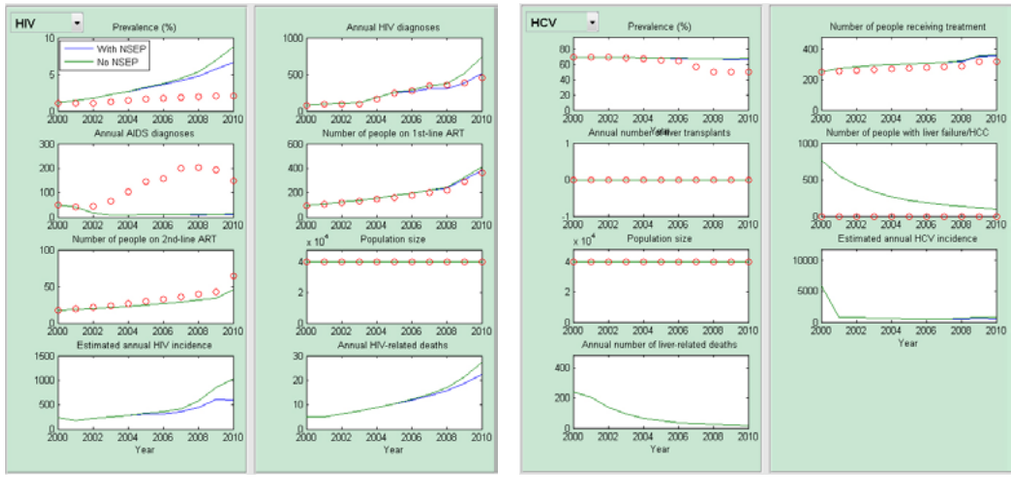
An extensive data collation, triangulation and synthesis process was undertaken in order to obtain all available epidemiological, behavioral and economic data relevant to people who inject drugs in Georgia. These data were entered into an input data template for the NEPEM software. The NEPEM was directly informed by these data and the model calibrated to the specific data for Georgia.

NEPEM was calibrated to describe the behaviors and HIV and HCV epidemiology among people who inject drugs in Georgia (see Figure 4). Red dots indicate actual data, or interpolations between data, that are based on the information available in the country. The green line indicates the rate without NSEPs and the blue line indicates the rate with NSEPs available in the country. It is commonly acknowledged that the registered number of HIV/AIDS cases does not reflect

the actual spread of the infection in Georgia and that the estimated number of people living with HIV/AIDS is higher [29]. Thus the 6.5% of HIV prevalence suggested by the software did not fall far beyond the margins of experts' opinion.

Figure 4. Data and model-fit for (a) HIV and (b) HCV among people who inject drugs

a) **b)**



SUMMARY OF EVALUATION OF NSEPS IN GEORGIA, 2000-2010

A summary of the estimated impact of NSEPs in Georgia is provided in Table 1.

Table 1: Estimated HIV- and HCV-related epidemiological and economic outcomes with and without NSEPs in 2000-2010 (discounting from the perspective of the year 2010)

	With NSPs	Without NSPs	Change
		10% (20%, 0%) pharmacy offset assumptions	
Summary of HIV			
Prevalence of HIV among IDUs (2010)	6.5%	8.8% (8.5-9.0%)	2.3% (2.0-2.5%)
Cumulative incidence of HIV infections	3643	4707 (4603-4807)	1064 (960-1164)
Cumulative number of HIV-related deaths	123	135 (134-136)	12 (11-13)
QALYs gained (3% discounted)	148 (136-160)		
HIV-related health costs (3% discounted)	$2.45m	$2.53m ($2.52-2.53m)	$75,188 ($69,852-80,208)
Summary of HCV			
Prevalence of HCV among IDUs (2010)	66.4%	68.2% (68.0-68.3%)	1.8% (1.6-1.9%)
Cumulative incidence of HCV infections	6,612	7,418 (7,345-7,488)	806 (733-876)
QALYs gained (3% discounted)	1,450 (1,337-1,556)		
HCV-related health costs (3% discounted)	$313,691	$315,389 ($315,256-315,513)	$1,697 ($1,565-1,822)
	Discounted	**Undiscounted**	
Financial investment in NSEPs (2000-2010)	$1.35m	$1.19m	
Summary: 2000-2010			
QALYs gained	1,598 (1,473-1,716)	1,529 (1,408-1,643)	
Health costs saved	$78,865 ($69,852-80,208)	$75,188 ($73,303-84,097)	
Cost per QALY gained (NB: Very cost-effective if less than GDP=$2,620)	$795 ($740-869)	$730 ($674-794)	
Summary: 2000-Lifetime			
QALYs gained	22,367 (20,200-24,427)	12,405 (11,217-13,534)	
Health costs saved	$4.67m ($4.19-5.13m)	$3.05m ($2.74-3.34m)	
Cost per QALY gained	Cost-saving	Cost-saving	
Return on investment	Investment + 246%	Investment + 156%	

The modeling exercise gives an estimated 6.5% prevalence of HIV among people who inject drugs in Georgia (a 2009 BSS study reported a 2.1% average, [30]). NSP programs helped to prevent 1064 HIV infections and 12 HIV related deaths. 148 quality-adjusted life-years (QALYS) were gained thanks to HIV-related benefits between 2000 and 2010. The software provides an estimate of some 806 HCV cases averted and 1450 QALYS gained as a result of these aversions.

Changes to NSEPs in the future

If NSEPs were to decrease in the distribution of injecting equipment, and there was no offset compensating access to sterile injecting equipment, then relatively large increases in both HIV and HCV could be expected with associated losses of health and life and reduced returns on investment (Figure 5, Table 2). For example, if we had to decrease the number of needles/syringes distributed by 50%, we would fail to avert more than 13,000 new HIV infections that otherwise would have been prevented in the next 10 years in Georgia. Significant public health benefits can be attained with further expansion of sterile injecting equipment distribution, provided further distribution reaches people who inject drugs in an effective manner such that the relationship between sharing rates and commodity distribution (Figure 5) remains.

Figure 5: Projections of HIV and HCV prevalence, incidence and deaths among people who inject drugs in Georgia due to assumptions about decreases or increases in NSEP distribution of injecting equipment.

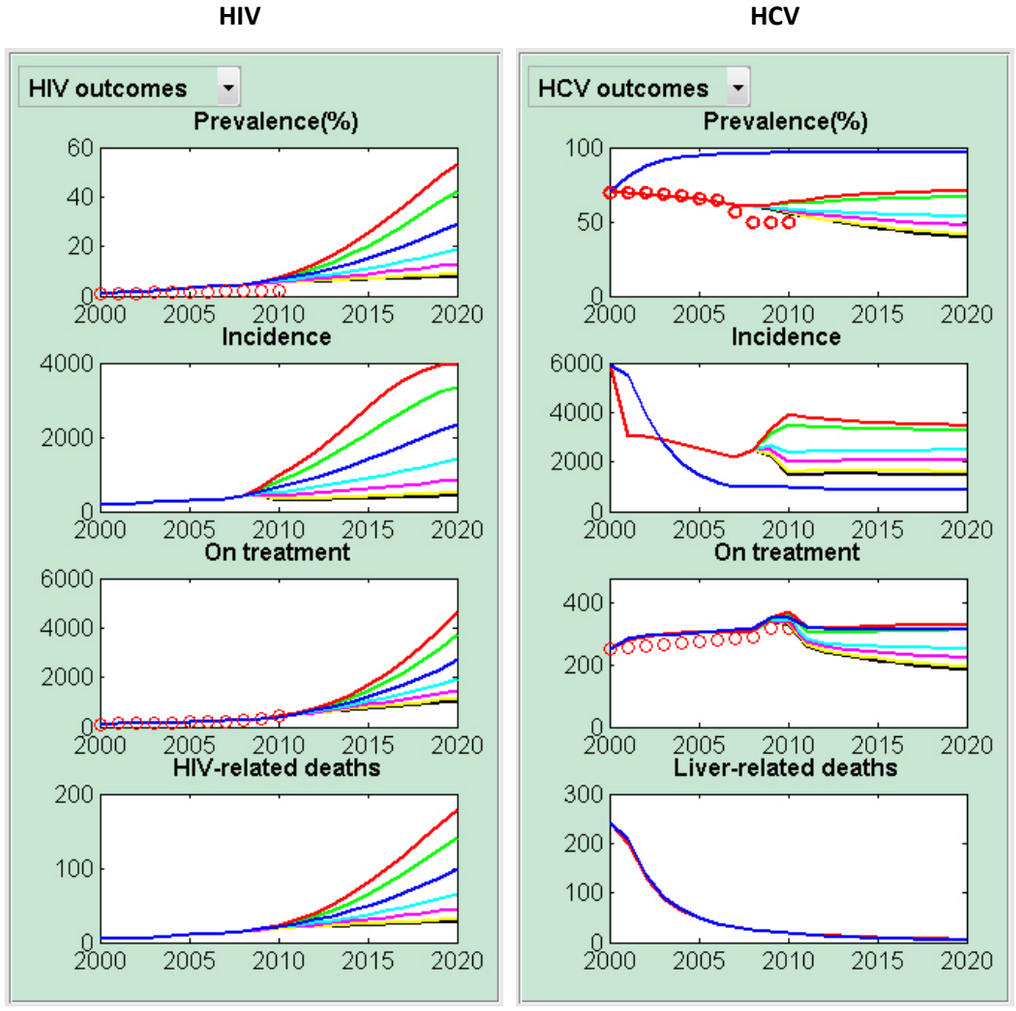


Table 2: Projected impact associated with changes in NSEPs over the next 10 years (2011-2020)

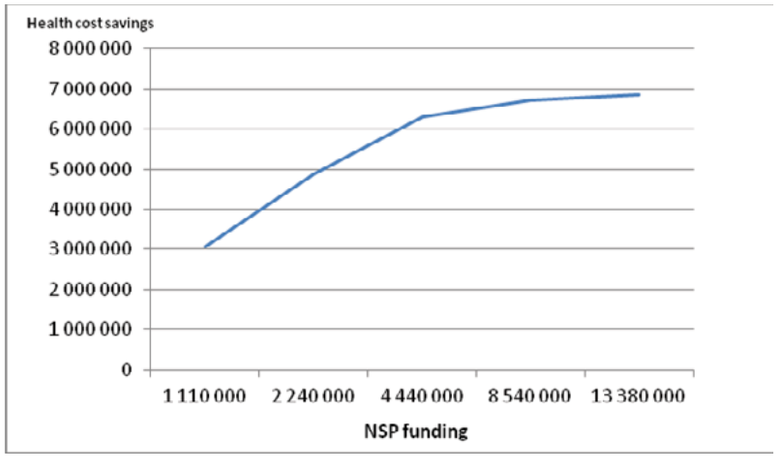
Maintain current levels	4.46m	105 285	15 244	19 187	15 018 179	671	0 (Ref)
NSEP investment	**Change in NSEP spending * ($ mil)**	**Change in QALYs**	**Change in infections (infections averted)****		**Return*** ($)**	**Lives saved**	**ICER****
			HIV	**HCV**			
50% reduction	-2.23	-11 163	-13 276	-5 986	-7 816 922	-386	199
25% reduction	-1.11	-6 735	-7 914	-3 786	-4 454 377	-222	164
25% increase	1.11	5 599	5 620	3 595	3 069 952	152	198
50% increase	2.24	9 555	8 794	6 381	4 891 851	241	234
100% increase	4.5	13 114	11 043	9 041	6 296 277	308	338
200% increase	8.54	14 296	11 669	9 952	6 716 614	327	597

* Assuming costs scale linearly with current implementation costs (undiscounted)
** Cumulative number of incidence (2011-2020)
*** Health costs saved (2011-2020)
****Incremental cost-effectiveness ratio (ICER) = (NSEP1 – NSEP0) / (QALY1 – QALY0)
The incremental cost-effectiveness ratios between alternative scenarios were estimated by dividing the incremental net cost of the scenarios by the incremental QALYs gained or lost.

If NSPs were operated at 200% of the current level (i.e. if funding were increased by 100%), the health and economic benefits would be outstanding. 11,043 new HIV infections and more than 9,000 new HCV infections would be avoided, and 308 lives would be saved. In financial terms, the cost of $8.96 mil USD ($4.46 to maintain the current level plus $4.5 to ensure a 100% increase) that would be needed to finance NSEPs, represents a savings of approximately $21.3 mil USD in health care costs over the next ten years (Table 2).

Figure 6 shows the relationship between NSP funding and savings in health care costs. Based on this figure, given the current NSEP format, a maximal financial benefit will be achieved with a 100% increase in NSEP funding. The financial return seems to not increase proportionally beyond a 100% increase in NSEP funding. Explanation of this fact may require more complex research into the program specifics of needle/syringe services in Georgia, to explore additional potential areas for improvement.

Figure 6: Change in health cost savings in relation to changes in NSEP investment (savings over short-term, 2011-2020 only)



CONCLUSIONS AND RECOMMENDATIONS

1. NSEP effectiveness in Georgia. Findings of the current study suggest that needle/syringe programs are effective and bring significant benefits to Georgian society in terms of preventing new HIV and HCV cases, reducing mortality related to these infections, and ultimately saving health care costs that otherwise are to be spent to provide relevant health services to people infected. The report provides conservative estimations on the direct benefits of implementing needle and syringe exchange programs in Georgia. It assesses the effectiveness of NSEPs in averting HIV and HCV infections among people who inject drugs only and does not include other possible benefits resulting from the prevention of mental, physical and social consequences of injecting drug use, as well as the benefits related to the prevention of HIV and HCV transmission to sexual partners and children of people who use drugs. This, in fact, can be considered one of the study's limitations. On the other hand, the study's findings obviously suggest the rationale for expanding the tool that would allow for analyzing the effects of other related interventions such as information and education, condom distribution, voluntary counseling and testing, medically assisted (agonist) treatment and other facets of HIV-prevention in Georgia.

Recommendation: Advance the tool and ensure future assessments / analysis of the cost-effectiveness of a full range of HIV prevention programmes, including both direct and indirect benefits & effects of the interventions.

2. Benefits of early interventions. Over the last ten years health care savings were $75 000, though projections into the next ten years reveal a much more significant health cost savings – more than $15 mil USD over the years 2010-2020 if the funding for NSPs remains at the current level. This in fact can suggest that in the early 2000s significant efforts were focused on setting up NSEP services as well as on staff training and other start up activities. The initial quality

and effectiveness of those services might have been lower at the beginning and has supposedly improved over time. Even so, NSEP investments between the years 2000-2010 have been able to produce a +246% return in investment over the 2000-lifetime perspective (Table 1).

Recommendation: Maximize the impact of HIV programmes and available services and sustain the long-term effects of prevention interventions through early initiation and the expansion of evidence based Harm Reduction programs for people who use drugs [31].

3. Optimal scale up scenario. The modeling exercise provided good evidence for increasing NSEP funding. The model suggests that a 100% increase is probably the optimal scenario in terms of health cost benefits given the current format of the NSEP implementation. Going beyond a 100% increase might not provide a proportional return in investment, although it will still deliver significant benefits to society in the form of new infections avoided, lives saved and QALYs gained.

Recommendation: Increase funding for needle-syringe exchange programs to ensure a 100% scale up in needles-syringes distributed.

4. Hepatitis C investments. The results could also suggest that extremely limited funding for hepatitis C-related interventions do not reach the threshold needed to produce tangible health and economic benefits and undermine the overall rational for otherwise potentially effective and cost-effective lifesaving investments.

Recommendation: Mobilize and increase funding for hepatitis C prevention and treatment.

5. Need for improving data quality. Evaluating the effectiveness and cost-effectiveness of interventions (in this case HIV prevention intervention) should be an integral part of evidence-informed policy development. Any evaluation, ongoing assessment or monitoring requires a set of reliable indicators and high-quality data to allow for meaningful analyses and interpretation. In this particular study (and to our knowledge, in other research and/or monitoring initiatives) the research team encountered difficulties in obtaining certain indicators, clearly suggesting the necessity for improving the country's NSEP data collection system.

Recommendation: Develop an effective NSEP / Harm Reduction data collection system with a comprehensive set of indicators harmonized with the newly introduced HIV/AIDS Monitoring and Evaluation system.

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