ANNEX to A pilot application of the Spectrum-STI model in a low-prevalence setting: Estimation of STI prevalence and incidence trends in Georgia

Version 13 December 2017

A1 Workshop related materials

A1.1 Workshop Scope and Purpose

Background

Estimation of the prevalence and incidence of STIs are important for STI programming, evaluation, resource mobilization and advocacy.

To support countries in evaluating levels and time trends in STI burdens, *Avenir Health* in collaboration with WHO developed the Spectrum-STI estimation model. This tool enables national program managers and surveillance staff to estimate their prevalence and incidence of syphilis, gonorrhea and chlamydia over time, and strengthen STI surveillance by informing data collection priorities.

The STI estimation model is integrated within the Spectrum suite of estimation and health policy planning tools (http://www.avenirhealth.org/software-spectrum.php). The Spectrum suite of programs has been developed to support estimation of national burdens, trends, service needs and program impact for family planning, HIV/AIDS, tuberculosis and malaria. Spectrum-STI was successfully piloted in number of countries across the world.

Georgia is the first country in the WHO European Region where STI Spectrum will be piloted.

Objectives and expectations

- To estimate adult syphilis, gonorrhea, chlamydia prevalence and incidence in Georgia over 1995-2016, based on available national data, using the Spectrum-STI tool;
    - Optionally, to estimate, based on adult female syphilis prevalence, the corresponding burden of congenital syphilis and associated adverse birth outcomes (by integrating the WHO's tool to estimate congenital syphilis into Spectrum);
- To interpret, agree and document these estimates, with a view to supporting Georgia's strategic STI control planning;
- To identify opportunities and priorities for strengthening national STI and Congenital Syphilis/elimination surveillance and estimation, by identifying any data gaps and data collection priorities;
- To train technical staff of the Ministry of Health involved in STI control and prevention and staff of leading national institutions including staff of NCDC, National STI Centre and regional public health institutions involved in STI surveillance in using Spectrum-STI to generate and update national STI estimates;
- To advocate for availability of national STI estimates, improvement of national STI data quality and its use for planning and monitoring of national STI control and prevention program;
- To alert national public health authorities on the necessity to monitor STI trends in at risk populations including MSM, sex workers and their partners, PWID, migrants and prisoners;
- To provide feedback to Avenir Health and the WHO to improve the Spectrum tool in user-friendliness, relevance and accuracy for use by the national STI program in Georgia and other countries.

Participants are requested

- To bring a laptop to practice doing STI estimations using the Spectrum tool.
- To install software in advance, from the Avenir Health website http://spectrumbeta.futuresinstitute.org/

Participants are requested to look prior to the workshop at these Spectrum guides

- Guide to Country data needed to inform a national STI estimation:https://spectrummodel.zendesk.com/hc/en-us/articles/115008306167-Application-of-the-Spectrum-STI-estimation-model-estimating-STI-prevalence-and-time-trends-Collating-Country-Data-
- Spectrum-STI overview / Podcast interview: https://soundcloud.com/bmjpodcasts/the-spectrum-sti-model-gonorrhea-and-syphilis-prevalence-in-low-and-middle-income-countries
- Spectrum scientific methods: http://sti.bmj.com/content/early/2017/03/21/sextrans-2016-052953 .

Background documents:
[1-8].

A1.2 Agenda -- workshop:

Wednesday 23 August 2017		
09:30–09:45	Welcome, introduction and purpose	Ms. Nino Berdzuli, MoLHSA Amiran Gamkrelidze, NCDC Melanie Taylor, WHO/HQ Annemarie Stengaard, WHO/Europe
09:45 –10.00	WHO global STI control strategy & congenital syphilis elimination	Melanie Taylor (WHO/HQ)
10.00:–10:20	STI control and prevention in Georgia	Tsira Merabishvili, NCDC
10:20 –10:40	STI surveillance system in Georgia	NCDC
10:40–11:10	COFFEE BREAK	
11:10 –12:00	Spectrum STI estimation tool	Eline Korenromp, Avenir Health
12:00–13:00	Review of Georgia's STI data: - Prevalence surveys: general population, ANC and key populations/IBBS (2014 and before) - Other surveys: risk behaviours, treatment - Routine ANC syphilis screening	Jane Rowley, WHO consultant
13:00–14:00	LUNCH	
14:00–14:40	Review of Georgia's STI data (continued): - Case reports (gonorrhoea, chlamydia) - Gonorrhoea antibiotic resistance	Jane Rowley/ Annemarie Stengaard/ Eline Korenromp
14:40–15:30	Questions and discussion	All
15:30–16:00	COFFEE BREAK	
16:00–17:00	Provisional national prevalence estimates: adult syphilis, gonorrhea and chlamydia	Jane Rowley Eline Korenromp
17:00–18:00	Discussion and closure of day 1	Annemarie Stengaard
Thursday 24 August 2017		
09:30–11.00	Practice Spectrum software	All
11:00–11.30	COFFEE BREAK	
11:30–12:00	Estimating incidence, from prevalence & treatment coverage Case reporting completeness, compared to estimated incidence	Eline Korenromp
12:00–12:30	HIV estimates and epidemiology in Georgia: historic time trends and year of peak incidence, key populations (prevalence and size estimates), HIV prevention indicators – comparing with STI	Otar Chokoshvili, Infectious Diseases, AIDS and Clinical Immunology Research Center
12:30–13:00	Questions and discussion	All
13:00–14:00	LUNCH	
14:00–15:00	WHO congenital syphilis estimation tool	Melanie Taylor Eline Korenromp
15:00–15:30	Congenital syphilis: - Data: Coverage of ANC 1st attendance, syphilis screening & treatment in ANC - Data: Congenital syphilis case reports Data: CS registry reviews: treatment histories Spectrum trend estimation	Ketevan Stvilia, NCDC Eka Ruadze, NCDC Eline Korenromp
15:30–16:00	COFFEE BREAK	
16:00–17:00	Recommendations for STI surveillance Recommendations for STI programming Recommendations to finalize estimations and improve Spectrum tool Next steps, timeline, responsibilities	WHO / NCDC
17:00–17:30	Final discussion and closure of workshop closure	WHO / NCDC

A1.3 Agenda – pre- and post-workshop sessions:

Monday 21 August 2017: Technical preparations		
13:00–17:00	Technical preparations: data review – discuss and fill data gaps as far as possible Download and install software on laptops	Eline Korenromp Jane Rowley Maia Tsereteli Ana Aslanikashvili
Tuesday, 22 August 2017: Pre-workshop meeting		
9:00–9:30	Review of workshop objectives and agenda	Maia Tsereteli Ana Aslanikashvili Melanie Taylor Annemarie Stengaard Eline Korenromp Jane Rowley
9:30–11:00	Pre-view of national STI data Preliminary STI estimates	
11:00–11:30	COFFEE BREAK	
11:30–12:30	Review PPT slides for the workshop	
12:30–14:00	LUNCH	
14:00–15:30	Validating elimination of mother to child transmission of HIV and Syphilis: process & criteria Discussion, questions and answers Participants: Maia Tsereteli, Ana Aslanikashvili, other NCDC?, MoH? Melanie Taylor, Annemarie Stengaard, Eline Korenromp, Jane Rowley	Melanie Taylor All
Friday 25 August 2017		
10:00–12:00	Final adjustments, implementation of modifications and updates identified during workshop	Eline, Jane, Ana, Keti

A1.4 Participants

Name	**Title**	**Affiliation**
Giorgi Galdava		National Center for Dermatology and Venerology
Maia Butsashvili	Infectionist	Clinic NeoLab
Soso Kobakhidze	STI specialist	
Otar Chokoshili		Infectious Diseases, AIDS and Clinical Immunology Research Center (IDACIRC)
Nino Badridze		IDACIRC
Nikoloz Chkhartishvili		IDACIRC
Nino Tsereteli		Tanadgoma (NGO)
Maka Gogia		Georgian Harm Reduction Center
Maia Alkhazishvili		Lugar Center for Public Health Research (reference lab)
Keti Stvilia		National Center for Disease Control and Public Health (NCDC), The Global Fund
Sandro Asatiani		NCDC, The Global Fund
Maia Tsereteli		NCDC
Tsira Merabishvili		NCDC
Ana Aslanikashvili		NCDC
Khvicha Getia		NCDC, STIs State Program
Ana Giguashvili		NCDC
Lela Shengelia		NCDC
Marina Shaxnazarova		NCDC
Eka Adamia		Ministry of Labour, Health and Social Affairs of Georgia (MoLHSA)
Natia Nogaideli		MoLHSA
Tamar Ugulava		Unicef
Elena Eristavi	PHC epidemiologist	Imereti region
Nona Epadze	PHC epidemiologist	Adjara region

Name	Title	Affiliation
Beth Skaggs	Head of Office	US CDC South Caucasus Office
Tamar Akhvlediani		Walter Reed Army Institute of Research
Eline Korenromp	Epidemiologist & Modeller	Avenir Health
Jane Rowley	Epidemiologist & Modeller	WHO consultant
Annemarie Stengaard	Epidemiologist	WHO Regional Office for Europe
Melanie Taylor	Medical officer	WHO Headquarters

A2 Population group sizes in Georgia

Table A2.1 records the estimated population size in 2016 of each of the population groups used in the analysis. The population group estimates for 2016 were estimated as follows:

- ANC women: Number of women with one or more ANC visits in 2016 (54,874)
- Blood donors: Set at the total number of blood donations recorded in 2016 (57,853) and split equally between males and females (28,926 females and 28,927 males)
- FSW: AIM file (July 2017) estimate for 2016 (9,017)
- MSM: AIM file (July 2017) estimate for 2016 (17,240)
- IDU: AIM file (July 2017) estimate for 2016 (38,878) and we assumed 80% of IDUs are male. This means in 2016 there were 31,102 male and 7,780 female IDUs
- Prisoners: Set at 12,000 of whom 15% were female (1,800).
- Wives of IDUs: Assumed 80% of IDUs are men, and 25% of these have a wife[1]. This means that there were 7,775 wives of IDUs in 2016.
- Remaining population – female: total female population less the other population groups (i.e. blood donors, FSW, prisoners, IDU and wives of IDU) for syphilis and FSWs only for gonorrhoea and chlamydia
- Remaining population – male: total male population less the other population groups (i.e. blood donors, MSM, prisoners and IDUs) for syphilis and MSM only for gonorrhoea and chlamydia

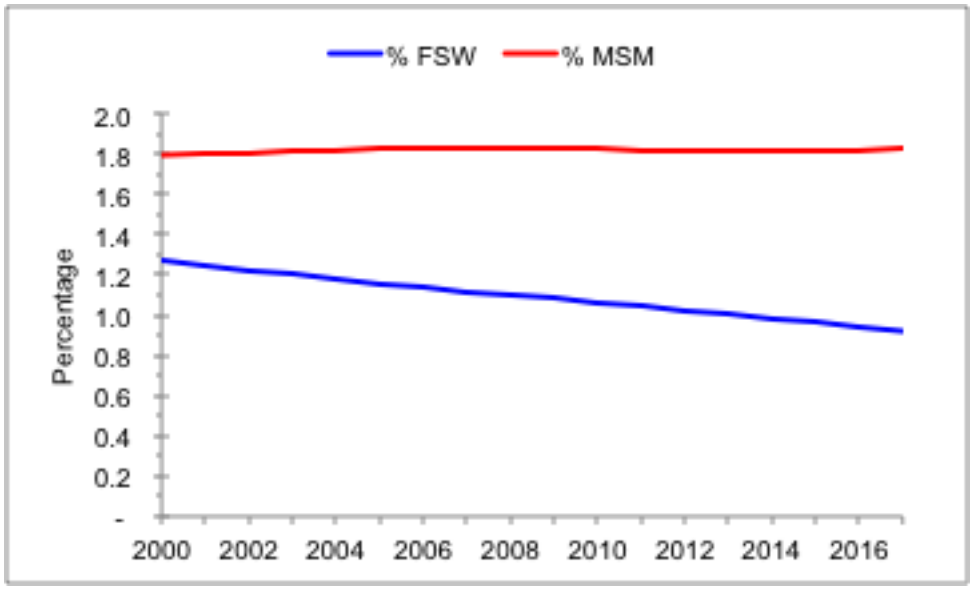
Table A2.1 Breakdown of the 2016 adult 15 to 49 years of age by population group. The total population in 2016 in the AIM file for the 15 to 49 age group was 1,906,450 of which 958,175 were female and 946,379 were male.

Females							
	ANC	**Blood donors**	**FSW**	**Prisoners**	**IDU**	**Wives of IDU**	**Remaining Population**
Population size	54,874	28,926	9,017	1,800	7,677	7,776	848,105
% female pop	5.73	3.02	0.94	0.19	0.80	0.81	88.51
Males							
		Blood donors	**MSM**	**Prisoners - male**	**IDUs**		**Remaining Population**
Population size		28,926	17,240	10,200	30,706		859,307
% male pop		3.06	1.82	1.08	3.24		90.80

Figure A2.1 records changes over time from the AIM file in the proportion of the female population that were FSWs and the proportion of the male population that were MSM. The proportion of FSWs fell over time from 1.33% in 2000 to 0.96% in 2016 whilst the proportion of MSM increased slightly – from 1.71% in 2000 to 1.78% in 2016.

Figure A2.1 AIM population size estimates for FSWs, MSMs for Georgia, 2000-2018. Data based on AIM file accessed in July 2017. Figure shows the percentage of the female population that are FSWs and the percentage of the male population that are MSM.

[1] Data from the Global Fund suggests that 45% of IDUs are married; however we have used the lower figure here.



It should be noted that the figures used in the analysis are slightly different from the latest Georgian estimates. These estimates were generated using a variety of different estimation methods and triangulating the finding to generate the most plausible estimate

- FSWs: The latest estimate of FSW population size was done in 2014. The point estimate for 2014 for all cities in Georgia was 6,525 [9].
- MSMs: The latest estimate of the MSM population size was done in 2014 and focused on Tbilisi. The point estimate for Tbilisi for 2014 was 5,100, or 1.42% of the adult male population [10].
- IDUs: The latest national estimate of the IDU population size was done in 2014. The point estimate for 2014 was 49,700 [11].

A3 Case Reporting in Georgia

It is mandatory for physicians to report syphilis, chlamydia and gonorrhoea. However, not all cases are reported owing to the current government regulations that limit who can legally allowed to treat a sexually transmitted infection. Figure A3.1 records the annual number of cases reported since 1980 and Table A3.1 records the annual number of reported cases for each infection and for congenital syphilis from 2000 to 2016.

Figure A3.1 Number of reported cases of syphilis, gonorrhoea and chlamydia reported in Georgia. Data are from: the European CISID database (http://data.euro.who.int/CISID/) and NCDC. The peaks and troughs in case reporting reflect changes in government policies (e.g,. between 1997 and 1999 there was a mass syphilis screening programme with free treatment), changes in access to health care and preventive services, as well as changes in individual behaviour (see Annex A4).

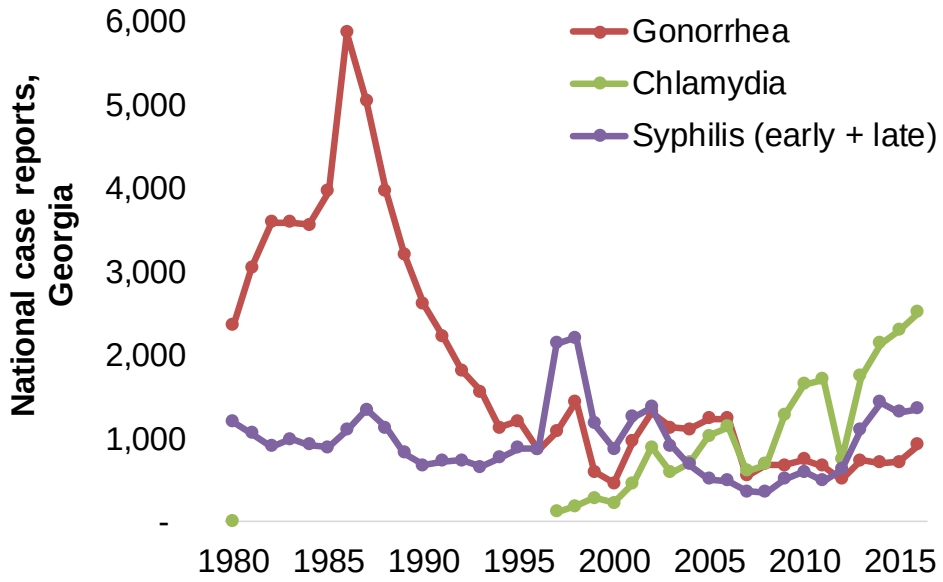
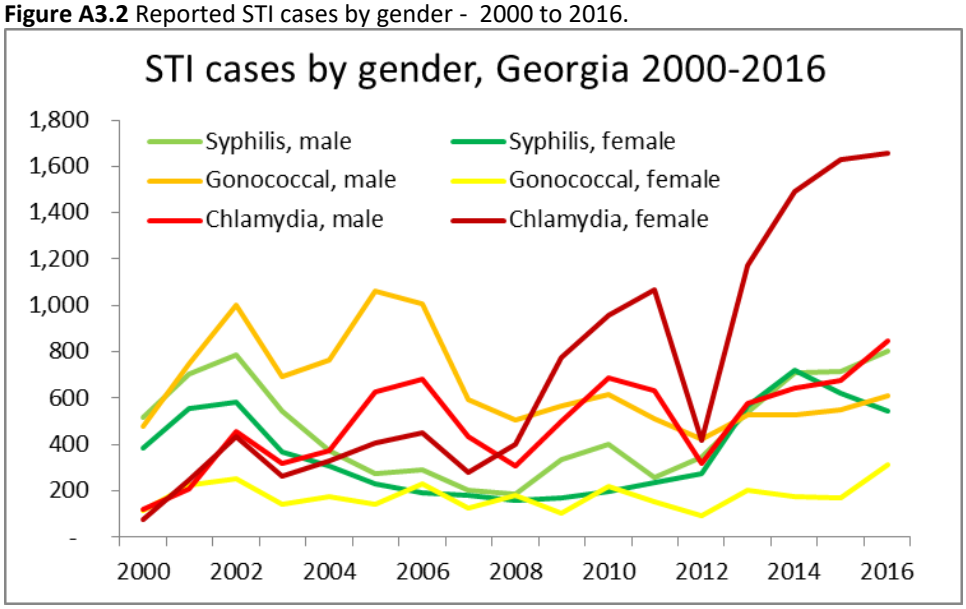


Table A3.1 Georgia: Reported STI cases by Year from 2000 to 2016. Data from the Georgian statistical yearbook and other NCDC sources.

Year	Syphilis	Chlamydia	Gonorrhea	Congenital Syphilis
2000	901	199	591	5
2001	1257	460	970	5
2002	1366	891	1259	9
2003	912	584	832	4
2004	681	704	935	3
2005	509	1030	1202	6
2006	485	1135	1235	1
2007	381	712	720	6
2008	346	709	684	0
2009	503	1276	670	3
2010	599	1646	741	2
2011	491	1700	662	8
2012	622	737	514	5
2013	1105	1748	728	13
2014	1431	2133	705	12
2015	1335	2304	717	17
2016	1349	2507	923	12

Figure A3.2 records the breakdown by gender for each of the infections between 2000 and 2016. For chlamydia the number of reported cases in women is greater than in men. For the other two infections more cases were reported in men than women. The male to female ratios for the cumulative number of cases reported between 2000 and 2016 were: syphilis = 1.3, gonorrhea= 3 .7 and chlamydia = 0.7.

Figure A3.2 Reported STI cases by gender - 2000 to 2016.



The age breakdown of the number of reported cases for 2014 to 2016 is reported in Table A3.2. Over 80% of the reported cases of syphilis and 95% of the reported cases of chlamydia and gonorrhea were in the 15 to 49 year age group.

Table A3.3 Age distribution of the reported STI cases by age group for the period 2014 to 2016.

	Syphilis	**Gonorrhoea**	**Chlamydia**
% aged 15-19	2%	6%	10%
% aged 20-29	28%	62%	55%
% aged 30-39	28%	24%	23%
% aged 40-49	23%	6%	8%

Table A3.4 records the geographical distribution of reported cases. In 2014, around 30% of the national population lived in Tbilisi and about 9 % in Ajara of whom about half were based in Batumi City (Wikipedia). Tbilisi and Ajara/ Batumi accounted for 77% of the syphilis cases, 60% of the gonorrhea cases and 88% of the chlamydia cases.

Table A3.4 Geographical distribution of the reported STI cases for the period 2014 to 2016

	Syphilis	**Gonorrhoea**	**Chlamydia**
Tbilisi	40 %	41 %	77 %
Ajara / Batumi	37%	19%	11%
Other	23%	40%	12%

A4 Drivers of STI trends

This section provides a summary of some of the drivers of STI trends under four headings: government STI policy, sexual behaviour and access to ANC services, STI diagnosis and treatment, and access to STI prevention services. This is not a comprehensive list but highlights some of the issues touched on at the meeting.

A4.1 Government STI policy

Table A4.1 summarizes some of the key changes in government health policy since 1990.

Table A4.1 STI treatment policies and practices over time, in Georgia

≤1991 (Soviet period)	Compulsory syphilis screening in pregnant women
Post-independence (1991)	Weakening of public services and access, declining ANC coverage
≤1994	All hospital admissions tested for syphilis (and HIV)
>1994	Some clinics/hospitals & some dentists test patients for syphilis. Compulsory hospitalization of syphilis patients gradually replaced by outpatient treatment using benzathin penicillin
1995	New STD reporting form (name replaced with a record number) as part of overall health care reform and discontinuation of soviet «san-epid» system Early stages of privatization with introduction of fee for services
1995-2003	System fragmentation
1997	New government STI programme introduced. Mass screening and case detection (driven by free STD diagnosis and free treatment for some STIs) [12, 13],. Resulted in increase in number of case reported between 1996-98 for gonorrhea and syphilis, but not for Chlamydia and Trichomoniasis as they had no state funding.
1999	Syphilis mass screening discontinued and free treatment stopped
2001 (?)	Syndromic approach launched at peripheral STD clinics, but not widely implemented
2003	Global Fund Program for FSW and MSM started
2003	Decentralization & privatization, stop public poly-clinics – reduced reporting?
2009	Free diagnosis & treatment for young people (under 26) discontinued. High risk groups, however, are still covered by Global Fund Program
2013	Reinforced government regulations re reporting. However, these regulations have had a limited impact on reporting completeness in practice.
2015	Change in government regulations. People are no longer able to buy gonorrhoea and chlamydia treatment OTC but must have a prescription

Sources: Discussions at the Spectrum STI workshop and [12, 13],[14-16].

A4.2 Sexual behaviour and access to ANC services

The information below is from the 2010 Reproductive Health Survey (reference?).

<u>Young Adult Behaviors</u>

- Nearly a third of young women (aged 15–24 years) in Georgia reported sexual experience (32%); of those, the overwhelming majority (31%) reported sexual initiation after marriage.
- Among young women who had their first sexual intercourse before age of 18, more than half had partners who were 5 or more years older.
- Contraceptive use at first sexual intercourse is uncommon in Georgia, regardless of marital status. The primary reasons given for not using a contraceptive method at first intercourse were wanting to get pregnant (67%) and not thinking about using a method (24%).

<u>Marriage and Fertility</u>

- Traditionally, Georgian women initiate and complete childbearing at an early age.

- Nearly 60% of women in the sample (aged 15-44) were married or in consensual unions, 7% were divorced or separated, and 34% had never been married.
- The TFR (total fertility rate) calculated from the 2010 survey was 2.0 births per woman (95%CI=1.9– 2.1) for the period 2007–2010.

Maternal and Child Health Services

- Use of prenatal care was almost universal: 98% of pregnant women received at least one prenatal examination. Initiation of prenatal care in the first trimester was more common in urban areas than in rural areas (93% vs. 86%) and was most widespread in Tbilisi (94%).
- Ninety percent of women received at least 4 prenatal care visits and this was more common among women in urban areas (95%) than in rural areas (86%).
- Virtually all (97%) babies born alive in 2005– 2010 were registered, according to the mother; how- ever, registered births ranged from a low of 92% in the region of Kakhe to a high of 99% in the region of Samtskhe-Javakhe.

A4.3 Access to diagnosis and treatment of STIs

Table A4.2 records changes in the percentage of women who self-report having received an STI test between 1999 and 2010 from the National Reproductive Health Surveys. Unfortunately, the last survey was done in 2010 and there are no data like this for men.

The 2005 study also provides information on the proportion of women who said they had received an STI test who reported having received the result. Over 90% of the women who reported having been tested for chlamydia, trichomoniasis, and yeast said they had received the result and 70% for syphilis and gonorrhea [17]

Table A4.2 Percentage of women (15 to 44) who self-reported to (ever?) having received an STI test. Data are from the Reproductive Health Surveys conducted in 1999, 2005 and 2010.

STI	**1999**	**2005**	**2010**
Yeast infection	22.5%	31%	27%
Trichomonas	17.9%	22%	6%
Chlamydia	2.8%	9%	2%
Gonorrhea	6.4%	7%	10%
Syphilis	9.5%	15%	0.30%
Any STI (excl. HIV)	30.2%	38%	29%

Data on where women reported seeking treatment for an STI were also collected in the National Reproductive Health Surveys (see Table A4.3). The data are not broken down by STI but are for STIs as a group.

Table A4.3 Where women sought treatment for an STI. Data are from the Reproductive Health Surveys conducted in 1999, 2005 and 2010 [13, 17, 18].

	1999	**2005**	**2010**
Sample	**Self-reported lab-diagnosed STI**	**Self-reported STI symptom**	**Self-reported STI symptom**
Ob/Gyn	21%	82.5%	80%
Nurse/Midwife/Maternity	7%	1.1%	
Other doctor		1.9%	3.2%
Polyclinic (public)*	48%	NA (after decentralization & privatization, from 2003)	
VD clinic	1%		
Rural/Ambulatory	6%		
Other			0.60%

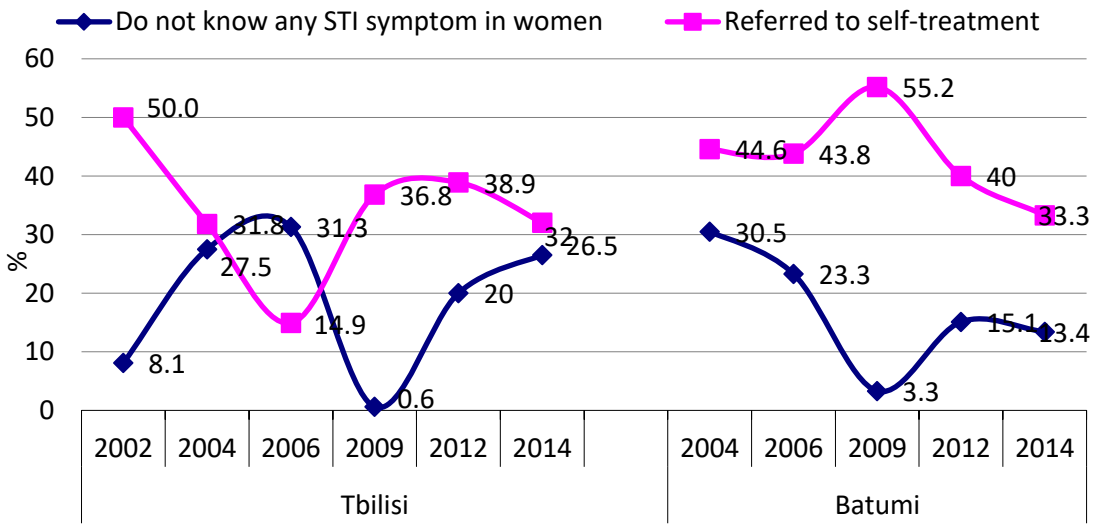
	1999	2005	2010
Sample	**Self-reported lab-diagnosed STI**	**Self-reported STI symptom**	**Self-reported STI symptom**
Pharmacist	12%	1.2%	
Friend/Relative	3%	1.7%	0.70%
Self-treatment, other than Pharmacist or Friend	3%	11.5%	15%
Total, sub-categories reporting treatment	101.0%	100.1%	99.9%
Total, treated	98%	46%	56%
No treatment	2%	54%	44%
Source	Figure 16.2	Table 16.6.3, page 338	Table 16.6.3 and Figure 16.6

Information on the treatment seeking behaviour of FSWs in Tbilisi and Batumi who had one or more symptoms is available from the BBS survey conducted in 2014 [reference}

- State clinics/ hospitals: >60% at both sites
- Self-treatment: 32.2% in Tbilisi and 33.3% in Batumi
- Pharmacy/ drugstore: 8% in Tbilisi and 16.7% in Batumi)

Figure A4.1 shows time trends in the proportion of FSWs reporting self-treatment. There has been a slightly decline but this may not be representative of the general population as FSWs are able to seek free treatment through the Global Fund project.

Figure A4.1. Knowledge of STI symptoms and referral to self-treatment among FSWs in Tbilisi and Batumi. Data are from the 2014 BBS in FSW.



A4.4 Access to STI prevention services

Some data from the general female population are available from the 2010 Reproductive Health Survey 2010 [18]. The number of women aged 15 to 44 reporting ever having used a condom as a contraceptive method increased from 10% in 1999 to 13% in 2005 and 20% in 2010, and the number of women who spontaneously mentioned condoms as a means of HIV prevention increased from 35% in 2005 to 51% in 2010.

Table A4.4 records data on access to HIV prevention programs among MSMs, FSWs and IDUs. This starts from 2009-10, the year that Global Fund HIV grants to Georgia started to focus on key

populations. The prevention package typically includes STI screening, but the data as reported to the Global Fund are not dis-aggregated by type of service.

The data document an increase in coverage among MSM from 2015 to 2016, reflecting scale-up of Global Fund-supported MSM services from 2014. The drop from 2014/15 to 2015 in contrast, may not be a real decrease in coverage, but rather reflect a change in the denominator. In 2015 the denominator was increased, reflecting the results from a population size estimation exercise undertaken in 2013-2014; still there remains some uncertainty about the sizes of these key populations, in key cities and nation-wide.

Table A4.4 Coverage of key populations with Global Fund -supported HIV Prevention Interventions packages. Data reported by the Principal Recipient (NCDC) to the Global Fund for grant progress evaluation and performance-based funding

	2009/10	*2012*	*2014/15*	*2015*	*2016*
MSM, Tbilisi or national ?	36.7% or 20.9%?	48.3%	51.3%	18% (2,983/17,000)	23% (3,826/17,000)
FSW, Tbilisi or national ?	66.9%	55.6%	51.3%	34% (2,180/6,525)	49% (3,160/6,525)
IDU, Georgia	30.3%	24%	32.4%	70%? (34,800/ ??)	61% (30,330/49,700)
Type of data	BBS data	BBS data	BBS data	Programmatic	Programmatic
Source	*http://curatiofoundation.org/hivaids-overall-picture/*			Global Fund data	

A5 HIV prevalence and Incidence trends

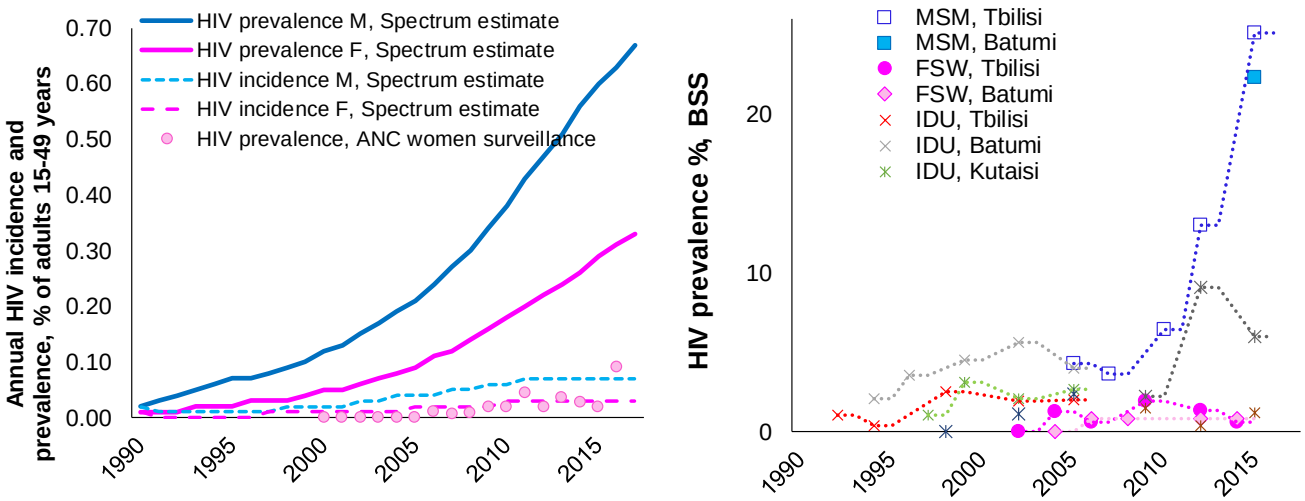
Figures A5.1 record temporal trends in the estimated annual HIV incidence and prevalence from the Spectrum AIM fitting and the prevalence estimates from various population groups from the BBS surveys. These data have been included to inform and compare against the temporal trends in syphilis, gonorrhea and chlamydia.

HIV, syphilis, chlamydia and gonorrhea are all transmitted sexually and hence have the same underlying sexual risk behaviours. In addition, STIs are a cofactor in HIV transmission and STIs can be an opportunistic infection in HIV positive individuals.

In concentrated and low-level epidemics, such as Georgia, HIV and STIs, however, may not share the same age/sex pattern and time trend, and distribution between population groups. This reflects the fact that HIV has a longer duration of infection and a lower transmission probability than STIs, and some STIs (chlamydia) have acquired immunity.

Georgia's national HIV estimates are fitted to HIV prevalence data from ANC women (from routine screening), used to anchor the prevalence for 'other women' as well as 'other men' (assuming equal prevalence), and to prevalence measured in BBS for FSW and MSM. Per the latest (2017) estimates, HIV incidence is stable or increasing. As for syphilis (and probably, though less certain, for gonorrhea and chlamydia), there are large prevalence differentials within the national population: highest in MSM, than FSW, then much lower in the remaining general/low-risk population.

Figure A5.1 Georgia's Spectrum AIM trend estimates, 2017



A6 Etiology data from Georgia

Table A6.1 Summary of studies not included in the analysis that provide additional data on the etiology of STIs in Georgia

Year of study	Population	Etiologies	Source
2000-2012	National Centre of Dermatology and Venereology, Tbilisi, 9,436 patients from high-risk groups (FSW, MSM, IDU, people <25 years) of whom 6,796 had notifiable STI	Gonorrhea N=2,057 (21.8%), of which 50% Men. Chlamydia N=2,954 (31.3%), of which 48.3% Men. Trichomonas N=2,680 (28.4%), of which 28.8% Men. Syphilis N=1,745 (18.5%) ; decreased over 2005-2012 } 9,456 total STI patients	[16] *
		Gonorrhea N=1,458 (21.5%). Chlamydia N=2,348 (34%), of which 44% Men. Trichomonas N=1,798 (26.5%), of which 28.8% Men. Syphilis N=1,193 (17.5%), of which 61% Men. – peak 2002-2004 } 6,797 total STI patients	[15] *
2011	M & F symptomatic patients, Tbilisi	M with UD or discomfort during urination: 9/83 (?) = 10.8% CT F patients with VD or abdominal pain: 0/83 (?) = 0% CT.	[19]
2011-2016	State program data	2011, 111 STI patients: 8% syphilis, 4.5% NG, 7% CT. 2011, 142 STI patients: 1.6% syphilis, 1.1% NG, 4.3% CT. 2012, 202 sample laboratory examinations: N=4 syphilis, 0 NG. 2013: Of 50 patients, 0% NG.	STI Institute Data, Tbilisi provided in August 2017
2016?	Military with UD, hospital, N=100	25% NG, ~25%? CT, 6 both NG+CT	Walter Reed Institute (manuscript in prep)
2016	STI institute laboratory – samples CT-tested	DIF (+ very few PCR): 627/2975 (21.1%) CT.	STI Institute Data, Tbilisi provided in August 2017

***** These two papers appear to draw on the same data. Probably the different numbers reflect that Chiokadze S et al. 2014 reports data from the subset of patients with a notifiable STI only.

Table A6.2 Data from the 5 Cities Study conducted in 2016. Programmatic data for women and men seeking care for STI symptoms (Global Fund database, shared by Georgia CDC in May 2017)

a) Female Sex Workers (FSWs):

	Syphilis			Chlamydia			Gonorrhea		
	Number positive	Sample Size	Observed Prevalence	Number positive	Sample Size	Observed Prevalence	Number positive	Sample Size	Observed Prevalence
Tbilisi	56	643	8.7 %	154	640	24.1 %	6	640	0.9 %
Batumi	44	224	19.6 %	41	213	19.2 %	50	224	22.3 %
Kutaisi	41	193	21.2 %	74	190	38.9 %	28	185	15.1 %
Telavi	27	150	18.0 %	26	150	17.3 %	10	150	6.7 %
Zugdidi	33	116	28.4 %	16	116	13.8 %	47	116	40.5 %

b) Men who have Sex with Men (MSM):

	Syphilis			Chlamydia			Gonorrhea		
	Number positive	Sample Size	Observed Prevalence	Number positive	Sample Size	Observed Prevalence	Number positive	Sample Size	Observed Prevalence
Tbilisi	261	1,077	24.2	280	1,075	26.0 %	157	1,074	**14.6 %**
Batumi	64	272	23.5	47	261	18.0 %	60	272	**22.1 %**
Kutaisi	31	218	14.2	55	205	26.8 %	55	199	**27.6 %**
Telavi	2	6	33.3	1	6	16.7 %	2	6	**33.3 %**
Zugdidi	19	58	32.8	5	58	8.6 %	29	58	**50.0 %**

A7 Gonorrhea Antibiotic Resistance

Georgia follows the European treatment guidelines to treat all laboratory-diagnosed gonorrhea and syndromically diagnosed urethral discharge. There is however, some antibiotic resistance to gonorrhea. In 2014 national experts suggested in 2014 that resistance explains a high proportion (up to 20%) of gonorrhea cases that are recurrences [15, 16].

A study conducted in two STI clinics, on 273 male Urethral Discharge patients between April and November 2016, used bacterial culture, minimal inhibitory concentrations (MIC) European Committee on Antimicrobial Susceptibility Testing (EUCAST) criteria. The results are in Table A7.1

A new study is being planned to measure gonorrhea and chlamydia coinfection, and it may also look at risk factors (e.g., sexual orientation) to help interpret data and their programmatic implications.

Table A7.1 Results from 2016 gonorrhoea resistance study [20]

Study population	2 STI clinics, 273 male UD patients, April-Nov. 2016.
Testing regimen	Bacterial culture, minimal inhibitory concentrations (MIC) European Committee on Antimicrobial Susceptibility Testing (EUCAST) criteria.
Results	Of the 273 specimens 23 gonorrhea-positive
Antimicrobial susceptibility	23 tested • ciprofloxacin: 18 (78.3%) resistant, 2 (8.7%) intermediate result • cefixime: 5 (22%) resistant • benzylpenicillin: 4 (17.4%) resistant, 15 (65.2%) intermediate result • Azithromycin: 4 (17.4%) resistant, 8 (34.8%) intermediate result • Ceftriaxone: 0 (0%) resistant • Spectinomycin: 0 (0%) resistant

A8 Test Positivity Rates

The Reproductive Health Survey conducted in 1999 [13] provides data about self-reported STI tests received and test results among women 15-44 years (Table A8.1). In this annex, we explore if these data can be used to complement the scarce STI prevalence data.

Data on these two indicators provide an upper and a lower upper estimate of STI prevalence:

- *Lower estimate*: = % of women who self-report that they have ever been tested, multiplied by the self-reported test positivity rate, e.g. for chlamydia = 0.6%.
  This approach, also used within the RDS report, assumes that the testing was 100% well targeted to people at risk of STIs, in other words, that there are no chlamydia cases among women not tested. It also assumes that self-reported testing refers to exactly 1 past year, not a longer period with past additional testing.

- *Upper estimate*: = The self-reported test positivity rate, e.g., for chlamydia =11%
  This approach assumes that STI testing is random and not targeted to people at higher STI risk, and that women not tested have the same prevalence as those tested.

For chlamydia and syphilis, our best Spectrum-based national prevalence estimate for adult women was within the range between the upper and lower estimate based on the RHS data. For gonorrhea, the Spectrum-based estimate was near the lower-bound estimate from the Reproductive Health Survey. Considering that the age range of RHS data was slightly younger (15-44 years) compared to the Spectrum estimates (15-49 years) and considering that some self-reported tests may have been farther than 1 year ago, broadly the Spectrum estimates are therefore consistent with the RDS data for all 3 STIs Given their wide range from lower-bound to upper-bound, however, the RDS data do not really help to narrow-down the Spectrum estimates -- and they are presented here for context and record.

Table A8.1 STI testing. Number of women who report that they have been tested and who report having had a positive STI test

STI	Ever tested	Upper estimate: Test Positivity Rate	Lower estimate: Ever tested * Test Positivity Rate	National Spectrum estimate - female
Trichomonas	17.9%	About 50%	9.5%	
Chlamydia*	2.8%	11%	0.6%	3.42 %
Gonorrhea	6.4%	6%	0.38%	0.35 %
Syphilis	9.5%	1%	0.1%	0.23 %
Applying this as prevalence proxy, assumes:		Prevalence equal in women tested and not tested.	• 0 prevalence in women *not* tested • Reported testing is not 'ever', but just over the one last year preceding the survey	

Note to Table A8.1: Source: The Reproductive Health Survey 1999 [13] . For chlamydia, the 3 indicators Ever tested, Test Positivity Rate and Lower estimate as reported in the RHS report are not internally consistent, but we present them as shown in the RHS report.

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