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Supplementary Digital Contents accompanying “Trends in adult chlamydia and gonorrhoea prevalence, incidence and urethral discharge case reporting in Mongolia from 1995 to 2016”

SDC1. Sensitivities and specificities assumed for diagnostic tests of chlamydia and gonorrhoea used to adjust observed prevalence levels before time trend estimation

Specimen	Sex	Test	Sensitivity %, gonorrhoea	Sensitivity %, chlamydia	Specificity %, gonorrhoea	Specificity %, chlamydia
Genital fluid	F	PCR	93.3 [1–3]	88.6 [1–3]	99.7 [1–4]	99.7 [1–3]
Genital fluid	F	Culture or Gram stain – in routine ANC setting	35.0 (authors’ estimate)	NA	100.0 [1–3]	NA

Abbreviations: ANC = antenatal care; NA = Not applicable, not used in studies included in the current estimation; PCR = Polymerase Chain Reaction (a type of nucleic acid amplification assay).

SDC 2. Chlamydia and gonorrhoea prevalence data that met inclusion criteria before and after adjustments for diagnostic test performance and missing high-risk populations for the Spectrum-STI prevalence trend estimation for 15–49 year old adults, Mongolia

(a) chlamydia

Years	Location [§]	Population & sample	N	Specimen	Diagnostic test	Observed Prevalence	Test-adjusted	High-risk-adjusted
2001-2002	10 randomly selected sites, nation-wide [5]	ANC (survey)	2000	Genital	PCR	19.3%	21.5%	23.7%
2008	17 provinces + capital city [6]	ANC (survey)	1 777	Genital	PCR	14.9%	16.5%	18.2%

(b) gonorrhoea

Years	Location [§]	Population & sample	N*	Specimen	Diagnostic test	Observed prevalence	Test-adjusted	High-risk adjusted
2001-2002	10 randomly selected sites, nation-wide [5]	ANC (survey)	2000	Genital	PCR	6.1%	6.5%	7.0%
2008	17 provinces + capital city [6]	ANC (survey)	1 777	Genital	PCR	3.9%	3.9%	4.3%
1997	Nationwide [7]	ANC (routine)	10 983	Genital	Culture or Gram stain	2.1%	6.0%	6.6%
1998	Nationwide [7]	ANC (routine)	10 599	Genital	Culture or Gram stain	2.0%	5.7%	6.2%
1999	Nationwide [7]	ANC (routine)	14 140	Genital	Culture or Gram stain	2.8%	8.0%	8.8%
2000	Nationwide [7]	ANC (routine)	16 479	Genital	Culture or Gram stain	1.6%	4.6%	5.1%
2001	Nationwide [7]	ANC (routine)	18 065	Genital	Culture or Gram stain	1.6%	4.6%	5.1%
2002	Nationwide [7]	ANC (routine)	16 854	Genital	Culture or Gram stain	1.7%	4.8%	5.3%
2003	Nationwide [7]	ANC (routine)	24 413	Genital	Culture or Gram stain	0.95%	2.7%	3.0%

Years	Location [§]	Population & sample	N*	Specimen	Diagnostic test	Observed prevalence	Test-adjusted	High-risk adjusted
2004	Nationwide [7]	ANC (routine)	39 424	Genital	Culture or Gram stain	1.2%	3.4%	3.7%
2005	Nationwide [7]	ANC (routine)	41 289	Genital	Culture or Gram stain	1.9%	5.4%	6.0%
2006	Nationwide [7]	ANC (routine)	43 205	Genital	Culture or Gram stain	0.84%	2.4%	2.6%
2007	Nationwide [7]	ANC (routine)	46 145	Genital	Culture or Gram stain	1.0%	2.7%	3.0%
2008	Nationwide [7]	ANC (routine)	63 772	Genital	Culture or Gram stain	0.88%	2.5%	2.8%
2009	Nationwide [7]	ANC (routine)	65 512	Genital	Culture or Gram stain	1.3%	3.7%	4.0%
2010	Nationwide [7]	ANC (routine)	65 178	Genital	Culture or Gram stain	0.16%	0.46%	0.51%
2011	Nationwide [7]	ANC (routine)	32 110	Genital	Culture or Gram stain	0.49%	1.4%	1.5%
2012	Nationwide [7]	ANC (routine)	84 953	Genital	Culture or Gram stain	1.1%	3.2%	3.5%
2013	Nationwide [7]	ANC (routine)	74 946	Genital	Culture or Gram stain	2.4%	6.8%	7.5%
2014	Nationwide [7]	ANC (routine)	75 995	Genital	Culture or Gram stain	0.62%	1.8%	2.0%
2015	Nationwide [7]	ANC (routine)	74 987	Genital	Culture or Gram stain	0.58%	1.7%	1.8%
2016	Nationwide [7]	ANC (routine)	69 278	Genital	Culture or Gram stain	0.48%	1.4%	1.5%

Abbreviations: ANC = antenatal clinics attended by pregnant women; N = sample size tested; PCR = Polymerase Chain Reaction (a type of nucleic acid amplification assay); High-risk adjusted = prevalence after (+10%) adjustment for missing high-risk populations; Test-adjusted = prevalence after adjusting for diagnostic test sensitivity & specificity; Weight = statistical weight used in the Spectrum trend estimation.

\$ As described in Methods, all survey data points from Mongolia were weighted 100%, all gonorrhoea data points from routine ANC screening were weighted 40% and the WHO 2012 regional estimate for the East Asian region was weighted 1%.

* The increase over time in sample sizes of routine ANC-based gonorrhoea screening reflects a gradual increase in screening activities over the time period, while some fluctuations likely reflect varying completeness of the reporting.

SDC3. Assumptions informing the estimations of prevalence, incidence and UD reporting completeness and etiology in Mongolia, 1995–2016

Parameter	Gonorrhoea		Chlamydia		Comments
	Men	Women	Men	Women	
M/F ratio in prevalence	0.86		0.80		Assumption of WHO 2012 regional and global estimates
Duration of infection, if untreated	0.40 years	0.50 years	0.90 years	1.25 years	Assumption of WHO 2012 regional and global estimates
Duration of infection, if treated	0.035 years	0.077 years	0.077 years	0.15 years	Assumption of WHO 2012 regional and global estimates
Weighted duration of infection	0.32 years	0.47 years	0.86 years	1.2 years	Calculated by weighting between above durations for episodes treated and untreated, using the below proportions treated:
% of incident cases developing symptoms	64%	34%	14%	11%	For chlamydia, WHO globally assumed 54% of men and 17% of women symptomatic worldwide ; Spectrum modeling for Mongolia assumed 11–14% [4], in line with earlier dynamic modelling estimates for sub-Saharan Africa [9].
% of symptomatic cases seeking treatment & treated	35% [3, 10]	22.5%	35% [3, 10]	22.5%	Women: WHO assumption used in 2012 global and regional estimates for countries with low-treatment access . Men: chlamydia duration fitted to the WHO stated average 1.01 year duration for low-treatment access countries
% of all incident cases treated	22.0% (= 64%* 35%)	7.7% (= 34% * 22.5%)	4.9% (= 14% * 35%)	2.5% (= 11% * 22.5%)	Calculated from the above.

SDC 4. Reported gonorrhoea and UD cases in Mongolia

The table below shows case notifications of bacteriologically confirmed gonorrhoea and of UD cases without laboratory testing (a non-overlapping set of cases), each nationally aggregated, as reported annually by Mongolia's National Center for Communicable Diseases up to April 2017 [7, 11].

Mongolia has had two phases in UD and gonorrhoea case reporting between 1995 and 2016:

- Up to 2004, gonorrhoea cases confirmed by laboratory tests (Gram stain and/or culture) were reported routinely.
- Since 2005, the syndromic approach to case management was implemented nationwide, and UD case reporting were included in Annual Reports of HIV, AIDS, STI Cabinet Registration.

An evaluation of the STI surveillance system in 2014 [12] noted a high level of attention to detailed recording and compiling of STI surveillance data (as a stand-alone system), including a section on syndromic management on the case report form. However, lack of a unified, standardized or comprehensive case definition document; varying diagnostic practices; duplicative forms and transmission processes; limited performance monitoring and supervision of surveillance practices; considerable under-reporting by private facilities combined with a high case load both in authorized (public and private) and unauthorized (private) facilities including pharmacies selling drugs without prescription have challenged the surveillance system. The resulting data are not practically used; notably, syndromic diagnoses are not used at all to inform programme management or planning [12]. Efforts are underway to establish electronic recording and communication systems, starting with hospitals throughout the country, and to align or integrate STI surveillance with that of HIV/AIDS and hepatitis.

Table S4.

Year	Gonorrhoea cases (laboratory-confirmed)	UD cases (not laboratory-tested)
1994	1763	-
1995	1575	-
1996	1569	-
1997	1491	-
1998	1728	-
1999	973	-
2000	2738	-
2001 [§]	3040	843
2002	2521	-
2003	2121	-
2004	2186	-
2005*	2934	1175
2006	2113	1172
2007	2082	1324
2008	2669	1275
2009	2833	1648
2010	2713	1207
2011	2731	638
2012	2662	485
2013	2485	468
2014	2461	342
2015	2944	542
2016	2625	606

§ The syndromic approach was initially considered since around 2000 with technical support from WHO with pilot implementation in 2001 that yielded 843 reported UD cases in that year.

* Introduction of the syndromic case management approach, nationwide.

SDC5. UD etiology, measured in studies among male UD patients in clinics in Mongolia

Table S5 shows results of two studies of UD etiology conducted in Mongolia since 1995. At 1995 and 2014–2015, gonorrhoea made up 53% and 51% of male UD cases seen in the clinics studied and chlamydia 14% and 18%, respectively.

Table S5. UD etiology, measured in studies among male UD patients in clinics in Mongolia

Time	N tested	Population	Site	Gonorrhoea	Chlamydia	Trichomoniasis	Non-Gonococcal Urethritis
1995 [13]	79	UD clinic patients	Ulaanbaatar, public STI clinic	53%	14%	Not reported	33%
2014-2015 [14]	299	UD clinic patients	Ulaanbaatar, NCCD clinic and other clinics	51%	18%	7.4%	23%

Abbreviations: NCCD = National Center for Communicable Diseases; UD = urethral discharge.

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