Appendix 1

Transparency International Georgia

The Georgian Health Insurance Industry

Statistical Methodology

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The statistical and sampling methodology presented in this appendix complements the research methodology presented in the TIG Report on the Georgian Health Insurance Industry and should, therefore, be read in conjunction with it.

Sampling frame: Georgia's population over 18

Sampling type: Stratified

The country's population was broken down into three groups:

First group

1. Population below the poverty line
2. IDP-s living in areas of resettlement
3. Children in foster care
4. Teachers
5. Tbilisi Municipal Insurance beneficiaries

Second group

Individual insurance holders
Corporate insurance holders of non-public organizations
Corporate insurance holders of public organizations

Control group

The uninsured

Population breakdown by groups is as follows:

Table 1

	Population	Percentage breakdown	Number of interviewees	Maximum margin of error at 95% confidence interval	Breakdown by groups	Sample weight
First group	909,903	25.6%	252	6.3%	35,7%	3611
Second group	402817	11.3%	100	10.0%	14,3%	4028
Third group	2,237,023	63.0%	350	5.3%	50%	6391
Total	3,549,743	100.0%	700		100%	

As shown in the Table 1 above, distribution of the samples is not proportional as each sample in each group had to be described independently. We believe 252 respondents in the first sample is enough to allow generalization inasmuch as: **1.** public insurance beneficiaries were randomly selected from the database **2.** the number (252) of respondents returned 6% margin of error at its widest (see respective MoE formulae below). **3.** social status makes for the relative homogeneity of public insurance beneficiaries in the first group.

Selection of fewer respondents (100) to the second group (corporate and individual insurance beneficiaries) was prompted by **1.** our focus on public insurance schemes **2.** homogeneity of income and awareness across the stratum.

Thus:

$$\Delta_{error} = 2 * \sqrt{\frac{p(1-p)}{n}}$$

The MoE is at its widest when p=0.5. Therefore :

$$\Delta_{max,error} = 2 * \sqrt{\frac{0.5(1-0.5)}{n}} = \sqrt{\frac{1}{n}}$$

Max MoE in the first group is:

$$\Delta_{max,error} = \sqrt{\frac{1}{252}} = \sqrt{0.003968} \approx 6.3\%$$

Where p is the group-wide probability and n is the sample size.

Weights for each group were obtained by dividing population (N) by sample size (n). The weight of the first group, for instance, is 3611 (909, 903/252).

Below we detail statistical rationale behind the answers to the four crucial questions of our insurance survey:

1. *What was the cost of the Georgian health insurers building hospitals, which was an externally imposed obligation, in terms of unjustly rejected insurance claims?*[1]

Twenty-eight of our insurance survey respondents happened to have their claims rejected. The number includes both ineligible and unjustly rejected insurance claims (See Ch 3[2] of the report for the definition of ineligible and unjustly rejected insurance claims as well as the explanation of how we removed the confounding variables).

Multiplier across public insurance scheme (PIS) beneficiaries being 3611 (See Table 1 above), 28 respondents in the sample returned 101,108 people in the population (28*3611=101,108).

Therefore, the margin of error (MoE) is:

$$\mathbf{p} = \frac{\mathbf{28}}{\mathbf{252}} = \mathbf{0.11} = \mathbf{11\%}$$

$$\mathbf{\Delta_{error}} = \mathbf{2} * \sqrt{\frac{11\%(\mathbf{1} - 11\%)}{252}} = \mathbf{3.9\%}$$

The MoE expressed in the number of PIS beneficiaries:

$$\mathbf{\Delta_{error}} * \mathbf{n} * \mathbf{weight} = \mathbf{3.9\%} * \mathbf{252} * \mathbf{3611} = \mathbf{35,489}$$

Therefore, we are 95% confident that the population MoE falls within:
$(\mathbf{101,100 - 35,489 : 101,100 + 35,489}) = (\mathbf{65,611 : 136,589})$

To estimate the number of ineligible claims **a.** we divided claims classed as ineligible by GPIH, a Georgian health insurer, in 2010 (381) by the claims classed as ineligible by GPIH in 2011 (686)[3] **b.** assuming normal distribution of the ineligible claims across the country's health insurers

[1] Building the hospitals was a major financial stress that put the health insurers on the defensive (See Ch 7 of the report for greater detail).
[2] The Georgian Health Insurance Industry, Transparency International Georgia
[3] The number of rejected claims includes claims that exceeded the limit.

participating in the public insurance scheme(PIS) [4] we estimated the number of ineligible claims in 2011 across all PIS health insurers, which was 56,150 ((381/686)*101,100).

Having estimated ineligible claims at 55% (381/686) of all rejected claims in 2011, we revised the MoE of ineligible claims with the MoE of all rejected claims (3.9%) downwards:

$$\Delta_{error} = 55\% * 3.9\% = 2{,}16\%$$

$$(56\,150 - 19\,655 : 56\,150 + 19\,655) = (36\,495 : 75\,805)$$

Therefore, the MoE expressed in the number of PIS beneficiaries who had their claims rightly rejected (i.e. ineligible claims) is :

$$\Delta_{error} * n * weight = 2.16\% * 252 * 3611 = 19{,}655$$

To estimate the number of unjustly rejected claims we subtracted the number of ineligible claims[5] (56, 150) from the rounded total of all rejected claims (101,100) to arrive at 44,950 (See Ch 3 of the report for greater detail on why we believe the unjustly rejected claims are attributable to health insurers building the hospitals[6]). Based on the average number of rejected PIS claims as revealed by our insurance survey we estimated the multiplier of all rejected PIS claims at 1[7].

Thus unjustly rejected claims in 2011 were 44% of all rejected claims (44,950/101,100). We revised the MoE of unjustly rejected claims with the MoE of all rejected claims (3.9%) downwards:

$$\Delta_{error} = 44\% * 3.9\% = 1.71\%$$

Therefore, the MoE expressed in the number of PIS beneficiaries who had their claims unjustly rejected is:

$$\Delta_{error} * n * weight = 1.71\% * 252 * 3611 = 15{,}560$$

$$(44950 - 15560 : 44950 + 15560) = (29390 : 60510)$$

2. *Out of 252 PIS beneficiaries that we targeted 40 said their monthly income ranged from GEL 401 to GEL 3000, while 20 of them said their income was GEL 300-400, which means they entered the*

[4] Although we asked all PIS health insurers to give us their breakdown of ineligible claims, GPIH was the only health insurer that provided the data (GPIH letter #225 III, June 13, 2012).

[5] Ineligible are the claims that are rightly denied by health insurers for running over the limit or claiming treatment which is not covered by insurance package.

[6] The Georgian Health Insurance Industry, Transparency International Georgia

[7] The number of rejected PIS claims is likely to be higher than the number of PIS beneficiaries whose claims were rejected. However, in our case the multiplier equals 1, which means the number of rejected PIS claims equals the number of PIS beneficiaries whose claims were rejected (101,108X1).

PIS fraudulently. Based on this survey finding how can we estimate the number of PIS beneficiaries whose income disqualifies them from being in the scheme?

However, for a conservative estimation we assumed 40 rather than 60 PIS beneficiaries were ineligible. The first sample weight being 3611 (see Table 1 above), 40 PIS beneficiaries in our survey returns 144,440 PIS beneficiaries across the country (40*3611=144,440).

The MoE is:

$$\mathbf{p} = \frac{\mathbf{40}}{\mathbf{252}} = \mathbf{0.159} = \mathbf{15.9\%}$$

$$\mathbf{\Delta_{error}} = \mathbf{2} * \sqrt{\frac{\mathbf{15.9\%(100\% - 15.9\%)}}{\mathbf{252}}} = \mathbf{4.6\%}$$

The MoE expressed in the number of PIS beneficiaries is:

$$\mathbf{\Delta_{error}} * \mathbf{n} * \mathbf{weight} = \mathbf{4.6\%} * \mathbf{252} * \mathbf{3611} = 41{,}855$$

Therefore, we are 95% confident that the number of PIS beneficiaries who do not belong in the scheme falls within:

$$(\mathbf{144{,}440} - \mathbf{41{,}855} : \mathbf{144{,}440} + \mathbf{41{,}855}) = (\mathbf{102{,}585} : \mathbf{186{,}295})$$

3. The survey showed that 74 of the 252 PIS beneficiaries were willing to pay GEL 5 a month to get services not included in the public insurance package. Based on this survey finding how can we estimate the number of PIS beneficiaries who would pay GEL 5 a month to get services not included in the public insurance package?

The first sample weight being 3611 (see Table 1 above), 74 PIS beneficiaries in our survey returns 267,214 PIS beneficiaries across the country (74*3611=267,214).

The MoE is:

$$\mathbf{p} = \frac{\mathbf{74}}{\mathbf{252}} = \mathbf{0.571} = \mathbf{29.4\%}$$

$$\mathbf{\Delta_{error}} = \mathbf{2} * \sqrt{\frac{\mathbf{29.4\%(100\% - 29.4\%)}}{\mathbf{252}}} = \mathbf{5.7\%}$$

The MoE expressed in the number of PIS beneficiaries is:

$$\Delta_{error} * n * weight = 5.7\% * 252 * 3611 = 51{,}864$$

Therefore, we are 95% confident that the number of PIS beneficiaries who would pay GEL 5 a month to get services not included in the public insurance package falls within:

$$(267{,}214 - 51{,}864 : 267{,}214 + 51{,}864) = (215{,}349 : 319{,}078)$$

4. *7 out of 252 PIS respondents said they had bought medicines that they did not need in the past 12 months to use up the GEL 50 limit of 50% off the outpatient prescription drugs. Based on this survey finding how can we estimate the number of PIS beneficiaries who in the past 12 months bought medicines that they did not need to use up the GEL 50 limit of 50% off the outpatient prescription drugs?*

Multiplier across PIS sample being 3611(see Table 1 above), the number of PIS beneficiaries in the habit of hoarding medicines is 25,277 (7*3611=25,277).

The MoE is:

$$p = \frac{7}{252} = 0.28 = 2.8\%$$

$$\Delta_{error} = 2 * \sqrt{\frac{2.8\%(100\% - 2.8\%)}{252}} = 2.1\%$$

The MoE expressed in the number of PIS beneficiaries is:

$$\Delta_{error} * n * weight = 2.1\% * 252 * 3611 = 19{,}107$$

Therefore, we are 95% confident that the number of PIS beneficiaries, who in the past 12 months bought medicines that they did not need to use up the GEL 50 limit of 50% off the outpatient prescription drugs, falls within:

$$(25{,}277 - 19{,}107 : 25{,}277 + 19{,}107) = (6{,}169 : 44{,}384)$$

However, the low number of PIS beneficiaries who admitted the hoarding pushed the MoE up, thereby detracting from the credibility of the estimate.