Table 1. Relevant statistical data for some components of the high school educational system in the State of Kuwait [18].

|  |  |
| --- | --- |
| Category | Total |
| High schools in Kuwait | 132 |
| High schools for girls | 69 |
| High schools for boys | 63 |
| Female high school students | 40119 |
| Male high school students | 31129 |
| Female high school staff members | 6669 |
| Male high school staff members | 5352 |

Table 2. Equivalence readings between RLU units values of *E. coli* bacteria obtained by MicroSnap kit and the colony forming units (CFU).

|  |  |
| --- | --- |
| RLU values | Equivalence colony forming units (CFU) |
|  | EnSUR |
| ≤10 | ≤40 |
| 30 | 125 |
| 100 | 300 |
| 300 | 800 |
| 1000 | 2,000 |
| 3000 | 5,500 |
| 10,000 | 15,000 |
| 30,000 | Above display range |
| 100,000 | Above display range |
| 300,000 | Above display range |
| 1,000,000 | Above display range |

Table 3. *E. coli* bacteria prevalence in 46 high schools which were randomly selected with 3 duplicate swab samples aseptically collected from 3 surfaces (flush handle, shower bidet, and seat) in each lavatory.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | School Name | Flush Handle  Reading  (RLU) | Bidet shower  Reading  (RLU) | Seat Reading  (RLU) |
| 1 | Al-Mansouryah | 0 | 0 | 0 |
| 2 | Essa Ahmed Al-Hamad | 0 | 0 | 0 |
| 3 | Lateefa Al-Shemali | 0 | 0 | 0 |
| 4 | Saad Ben Rabeea'a | 0 | 0 | 0 |
| 5 | Abdullah Al-Jaber Al-Sabah | 0 | 0 | 0 |
| 6 | Al-Jazae'r | 0 | 0 | 0 |
| 7 | Yousef Ben Essa | 0 | 0 | 0 |
| 8 | Al-Yarmouk | 0 | 0 | 0 |
| 9 | Jaber Al-Ahmad Al-Sabah | 0 | 0 | 0 |
| 10 | Abdullah Abdulateef Al-Rejeeb | 0 | 0 | 0 |
| 11 | Salwa | 0 | 0 | 0 |
| 12 | Falasteen\* | 1 | 1 | 4 |
| 13 | Al-Jabryah | 0 | 0 | 0 |
| 14 | Fatema Al-Sara'awy | 0 | 0 | 0 |
| 15 | Nasser Abdulmuhsen AL-Saeed | 0 | 0 | 0 |
| 16 | Al-Kendy | 0 | 0 | 0 |
| 17 | Al-Zoor | 0 | 0 | 0 |
| 18 | Fatema Bent Asad | 0 | 0 | 0 |
| 19 | Um Al-Heaman | 0 | 0 | 0 |
| 20 | Lateefa Al-Fares | 0 | 0 | 0 |
| 21 | Al-Ahmadi | 0 | 0 | 0 |
| 22 | Balat Al-Shuhada'a | 0 | 0 | 0 |
| 23 | Omar Ben Al-Khatab | 0 | 0 | 0 |
| 24 | Al-Retqqa | 0 | 0 | 0 |
| 25 | Al-Emam Malek | 0 | 0 | 0 |
| 26 | Abdullah Mubarak Al-Sabah\* | 1 | 2 | 1 |
| 27 | Fatema Al-Hashemyah | 0 | 0 | 0 |
| 28 | Sabah Al-Salem | 0 | 0 | 0 |
| 29 | Al-Shargeyah | 0 | 0 | 0 |
| 30 | Sabah Al-Salem | 0 | 0 | 0 |
| 31 | Abraq Kheetan | 0 | 0 | 0 |
| 32 | Al-Mubarakeyah | 0 | 0 | 0 |
| 33 | Ruzainah | 0 | 0 | 0 |
| 34 | AnasIbenMalek | 0 | 0 | 0 |
| 35 | Labeed Iben Rabeea'a\* | 26 | 27 | 20 |
| 36 | Abdulateef Thnyan Al-Ghanim\* | 25 | 28 | 22 |
| 37 | Al-Rabee'a bent Mua'aawath | 0 | 0 | 0 |
| 38 | Um Al-Hakam Bent Aby Sufyan | 0 | 0 | 0 |
| 39 | Al-Furdous | 0 | 0 | 0 |
| 40 | Al-Jahra\* | 2 | 1 | 0 |
| 41 | Al-Nawar Bent Malek\*\* | 2 | 3 | 1 |
| 42 | Mohammed AL-Meheani | 0 | 0 | 0 |
| 43 | Um Al-Hareth Al-Anssaryah | 0 | 0 | 0 |
| 44 | Al-Jahra | 0 | 0 | 0 |
| 45 | Jaber Abdullah Al-Sabah\* | 2 | 5 | 2 |
| 46 | Suaad Bent Selameh | 0 | 0 | 0 |

\*Boys’ schools with *E. coli* bacteria prevalence with various values.

\*\*Girls’ schools with *E. coli* prevalence for its 3 tested contact surfaces.

Table 4. Statistical correlation test among the three sampling surfaces (flush handle, shower bidet, and seat) in each lavatory to test the prevalence of *E. coli* bacteria in 46 schools with correlation significant at the 0.01 level (2-tailed).

| Correlations | | | | |
| --- | --- | --- | --- | --- |
|  | |  | Flush Handle Readings (RLU) | Washing Bidet  Readings (RLU) | Seat Readings (RLU) |
| Flush Handle Readings (RLU) | | Pearson Correlation | 1 | .996\* | .990\* |
| Sig. (2-tailed) |  | .000 | .000 |
| N | 46 | 46 | 46 |
| Washing Bidet Readings (RLU) | | Pearson Correlation | .996\* | 1 | .990\* |
| Sig. (2-tailed) | .000 |  | .000 |
| N | 46 | 46 | 46 |
| Seat Readings (RLU) | | Pearson Correlation | .990\* | .990\* | 1 |
| Sig. (2-tailed) | .000 | .000 |  |
| N | 46 | 46 | 46 |

\*Correlation is significant at the 0.01 level (2-tailed)

Table 5. Chi-square test table representing the dependency correlation between the “Flush Handle” and the “Washing Bidet” readings.

| Title | | Value | df | Asymp. Sig. (2-sided) |
| --- | --- | --- | --- | --- |
| Pearson Chi-Square | | 1.648E2\* | 24 | .000 |
| Likelihood Ratio | | 54.340 | 24 | .000 |
| Linear-by-Linear Association | | 44.601 | 1 | .000 |
| N of Valid Cases | | 46 |  |  |
| \*Has 34 cells according to the statistical package (SPSS) representing 97.1% with an expected count less than 5 and the minimum expected count is 0.02 | | | | |

Table 6. The Chi-square test represents the dependency correlation between the “Flush Handle” and the “Toilet seat” readings.

|  |  |  |  |
| --- | --- | --- | --- |
| Title | Value | df | Asymp. Sig. (2-sided) |
| Pearson Chi-Square | 1.487E2\* | 20 | .000 |
| Likelihood Ratio | 44.988 | 20 | .001 |
| Linear-by-Linear Association | 44.085 | 1 | .000 |
| N of Valid Cases | 46 |  |  |
| \*Has 34 cells according to the statistical package (SPSS) representing 97.1% with an expected count less than 5 and the minimum expected count is 0.02 | | | | |

Table 7. The Chi-square test represents the dependency correlation between the “Washing Bidet” and the “Toilet seat” readings.

|  |  |  |  |
| --- | --- | --- | --- |
| Title | Value | df | Asymp. Sig. (2-sided) |
| Pearson Chi-Square | 2.064E2\* | 30 | .000 |
| Likelihood Ratio | 51.579 | 30 | .008 |
| Linear-by-Linear Association | 44.103 | 1 | .000 |
| N of Valid Cases | 46 |  |  |

\*Has 41 cells according to the statistical package (SPSS) representing 97.6% with an expected count less than 5 and the minimum expected count is 0.02

Table 8. Independent Samples analysis of variance of *E. coli* concentration readings between male and female lavatories.

|  |  | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
|  |  | Lower | Upper |
| Flush handle  RLU | Equal variances assumed | 10.325 | .002 | 1.650 | 44 | .106 | 2.50758 | 1.52019 | -.55618 | 5.57133 |
| Equal variances not assumed |  |  | 1.578 | 21.116 | .129 | 2.50758 | 1.58901 | -.79585 | 5.81100 |

Table 9. Group statistics for the measured data of 22 male and 24 female lavatories.

|  | gender | N | Mean | Std. Deviation | Std. Error Mean |
| --- | --- | --- | --- | --- | --- |
| Flush handle RLU | Male | 22 | 2.5909 | 7.44286 | 1.58682 |
| Female | 24 | .0833 | .40825 | .08333 |

Table 10. Group statistics for the measured data of 23 Asian squat and 23 European seat toilets irrespective of gender.

|  | Sampling position | N | Mean | Std. Deviation | Std. Error Mean |
| --- | --- | --- | --- | --- | --- |
| Toilet Seat RLU | Asian "squat" | 23 | 2.0000 | 6.02268 | 1.25582 |
| European "seat" | 23 | .1739 | .83406 | .17391 |

Table 11. Independent samples analysis of variance table testing Asian "Squat" and European "Seat" toilets of *E. coli* bacteria prevalence for male and female lavatories.

|  |  | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
|  |  | Lower | Upper |
| Seat Readings RLU | Equal variances assumed | 7.984 | .007 | 1.440 | 44 | .157 | 1.82609 | 1.26780 | -72900 | 4.38117 |
| Equal variances not assumed |  |  | 1.440 | 22.844 | .163 | 1.82609 | 1.26780 | -79755 | 4.44973 |