**Methods:**

**Linear mixed model (LMM) Analysis:**

We employed six random intercept linear mixed models to fit the expression of genetic materials after adjusting drainage availability, region location, and temperature. The data for the regions without drainage was collected from rural marketplaces. In the model, the two rounds of data collection were treated as random. The results show that drainage availability has a nearly significant impact on the Ct values of the ORF and N genes (ORF: beta=0.86, p-value=0.087 and N: beta=0.937, p-value=.062). As a result, in samples without drainage, the Ct value from ORF expression increases 0.86 units greater than in samples with drainage. When comparing drainage availability with without drainage, however, we found no significant difference in expression values of ORF and N gene. Furthermore, no significant differences in regions and temperature were discovered. It shows that a market-place sample (without drainage) may forecast epidemic surges in the same way as a drainage system could.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ORF | | | | | | N | | | | | |
|  | Ct Value | | Viral Load | | Copy Number | | Ct Value | | Viral Load | | Copy Number | |
|  | Estimate | P-value | Estimate | P-value | Estimate | P-value | Estimate | P-value | Estimate | P-value | Estimate | P-value |
| Without Drainage | 0.860 | 0.087 | -0.083 | 0.395 | -0.084 | 0.426 | 0.937 | 0.062 | -0.149 | 0.140 | -0.167 | 0.132 |
| With Drainage | Ref | - | Ref | - | Ref | - | Ref | - | Ref | - | Ref | - |
| Southern region | -0.006 | 0.993 | 0.035 | 0.806 | 0.016 | 0.916 | -0.988 | 0.180 | 0.110 | 0.456 | 0.089 | 0.583 |
| Central region | 0.997 | 0.159 | -0.179 | 0.195 | -0.200 | 0.180 | -0.147 | 0.836 | 0.003 | 0.981 | -0.007 | 0.960 |
| North-Eastern region | 0.556 | 0.441 | -0.205 | 0.145 | -0.217 | 0.154 | -0.175 | 0.808 | -0.004 | 0.979 | -0.037 | 0.815 |
| Northern region | Ref | - | Ref | - | Ref | - | Ref | - | - | - | Ref | - |
| Temperature | 0.010 | 0.404 | -0.002 | 0.384 | -0.002 | 0.474 | 0.001 | 0.966 | -0.001 | 0.881 | -0.001 | 0.955 |