#### Appendix Table 1. Definition of the health policy disease control strategies

| **ID** | **Group actions** | **Period** |
| --- | --- | --- |
| **Zero-COVID** | **Transition** | **New-normal** |
| **1** | **Domestic movement**  | Extremely high levels of social distancing restrictions are required. | Reduce the levels of social distancing restrictions. Only approach the social distance at high-risk areas. | No need the social distancing restrictions. |
| **2** | **Mask mandate** | Required the mask at community areas. | Required the mask at community areas. | Reduce the mask at community areas. Require mask at large group areas |
| **3** | **Measurement and Classification** | Classify and quarantine all the suspected cases who had history contact with confirmed cases. Isolating all the suspected and confirmed cases at specific quarantine areas. | Level the risk level of subjects and conduct home isolation with low level suspect subject.  | Home isolation and home treatment with suspected and confirmed cases. |
| **4** | **Prevention and controlling** | Achieving no community transmission. All public health control measures were applied to eliminate the occurrence of SARS-Cov-2 in the community.Quarantine at specific isolation areas for both cases and close contacts. | Accepting community transmission with low level. If the community cases increase, high level of public health control measure will be applied.Self -Quarantine at home for both cases and close contacts  | Accepting community transmission. Only conducting the high level of public health control measure if required.Self -Quarantine at home for confirmed cases |
| **5** | **Screening** | Mass test and tracking the transmission chains of suspected cases. PCR test was used as standard for confirmed cases. Test mandate both cases and close contacts | Reducing the tracking the transmission chains. Testing weekly at high level areas Test mandate both cases and close contacts | Not required tracking the transmission chains. Rapid test be used as the standard for confirmed cases. |
| **6** | **Vaccination** | Allocate vaccines to priority groups.  | Vaccination for all people aged 18 years and above. | Vaccination for all people aged 12 years and above. |

#### Appendix Table 2. COVID-19 Containment cycle (CCC) indices at each District of Bac Ninh Province

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A- Bac Ninh City** | **Total** | **Period** | **p-value \*** | **Multiple pairwise-comparison** |
| **Zero - COVID** | **Transition** | **New-normal** | **(1)****vs****(2)** | **(2)****vs****(3)** | **(1)****vs****(3)** |
| **(1)** | **(2)** | **(3)** | **p-value** | **p-value** | **p-value** |
| **(n=121)** | **(n=49)** | **(n=39)** | **(n=33)** |
|  **• Number of CCC per ward unit** |
| Mean (95%CI) | 3.9 (3.5 – 4.3) | 2.1 (1.8 - 2.4) | 4.7 (4.2 - 5.3) | 5.7 (5.0 - 6.3) | **<0.001** | **<0.001** | **0.030** | **<0.001** |
| Median (Q1 – Q3) | 4 (2 - 5) | 2 (1 - 3) | 4 (3.5 - 6) | 6 (5 - 7) |
|  **• Length of CCC per ward unit** |
| Mean (95% CI) | 11.5 (11.1 – 11.9) | 14.6 (14.2 - 14.9) | 1.9 (1.4 - 2.5) | 18.4 (17.8 - 19.0) | **<0.001** | **<0.001** | **<0.001** | **0.020** |
| Median (Q1 - Q3) | 2 (1 - 16) | 5 (1 - 18) | 1 (1 - 1) | 16 (6 - 19) |
|  **• Number of confirm cases per CCC at each ward unit**  |
| Mean (95% CI) | 28.2 (27.8 - 28.6) | 22.2 (21.9 - 22.5) | 4.3 (3.7 - 4.9) | 65.3 (64.7 - 65.9) | **<0.001** | **0.008** | **<0.001** | **0.039** |
| Median (Q1 - Q3) | 4 (1 - 14) | 3 (1 - 15) | 1 (1 - 8) | 11 (4 - 23) |

*\* Kruskal-Wallis test*

####

#### Appendix Table 2 (continued). The CCC indices at each District of Bac Ninh Province

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **B- Yen Phong District** | **Total** | **Period** | **p-value \*** | **Multiple pairwise-comparison** |
| **Zero - COVID** | **Transition** | **New-normal** | **(1)****vs****(2)** | **(2)****vs****(3)** | **(1)****vs****(3)** |
| **(1)** | **(2)** | **(3)** | **p-value** | **p-value** | **p-value** |
| **(n=77)** | **(n=26)** | **(n=28)** | **(n=23)** |
|  **• Number of CCC per ward unit** |
| Mean (95% CI) | 4.2(3.6 - 4.8) | 2.1 (1.5 - 2.7) | 5.1 (4.3 - 5.9) | 5.4 (4.1 - 6.6) | **<0.001** | **<0.001** | 1 | **<0.001** |
| Median (Q1 - Q3) | 4 (2 - 6) | 1.5 (1 – 3) | 5 (3 – 6) | 5 (3 - 7) |
|  **• Length of CCC per ward unit**  |
| Mean (95% CI) | 5.8 (5.2 - 6.4) | 3.6 (3.0 - 4.2) | 1.8 (0.9 - 2.6) | 13.2 (11.9 - 14.5) | **<0.001** | 0.12 | **<0.001** | **0.001** |
| Median (Q1 - Q3) | 1 (1 - 11) | 1 (1 – 2) | 1 (1 - 1) | 14 (1.5 – 17.5) |
|  **• Number of confirm cases per CCC at each ward unit** |
| Mean (95% CI) | 8.5 (7.9 - 9.1) | 4.5 (4.0 - 5.1) | 4.8 (3.9 - 5.6) | 17.5 (16.2 - 18.8) | **0.009** | 0.69 | **0.016** | **0.016** |
| Median (Q1 - Q3) | 3 (1 - 7) | 2.5 (1 - 5) | 2.5 (1 - 5) | 7 (3 - 24) |

*\* Kruskal-Wallis test*

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#### Appendix Table 2 (continued). The CCC indices at each District of Bac Ninh Province

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **C- Que Vo District** | **Total** | **Period** | **p-value \*** | **Multiple pairwise-comparison** |
| **Zero - COVID** | **Transition** | **New-normal** | **(1)****vs****(2)** | **(2)****vs****(3)** | **(1)****vs****(3)** |
| **(1)** | **(2)** | **(3)** | **p-value** | **p-value** | **p-value** |
| **(n=140)** | **(n=65)** | **(n=29)** | **(n=46)** |
|  **• Number of CCC per ward unit**  |
| Mean (95% CI) | 4.1 (3.7 - 4.5) | 2.4 (2.1 - 2.7) | 5.2 (4.5 - 5.9) | 5.9 (5.3 - 6.4) | **<0.001** | **<0.001** | 0.14 | **<0.001** |
| Median (Q1 - Q3) | 4 (2 - 6) | 2 (1 - 3) | 5 (4 - 6) | 6 (4.25 - 7) |
|  **• Length of CCC per ward unit** |
| Mean (95% CI) | 8.1 (7.7 - 8.5) | 5.8 (5.5 - 6.0) | 3.2 (2.5 – 4.0) | 14.5 (14.0 - 15.1) | **<0.001** | 0.50 | **<0.001** | **<0.001** |
| Median (Q1 - Q3) | 1 (1 - 12) | 1 (1 - 8) | 1 (1 - 2) | 13.5 (5 – 17) |
|  **• Number of confirm cases per CCC at each ward unit** |
| Mean (95% CI) | 11.1 (10.7 - 11.4) | 4.6 (4.3 - 4.9) | 5.6 (4.9 - 6.3) | 23.8 (23.3 - 24.4) | **<0.001** | 0.75 | **<0.001** | **<0.001** |
| Median (Q1 - Q3) | 3 (1 - 7) | 1 (1 - 5) | 2 (1 - 5) | 6 (3 - 10) |

*\* Kruskal-Wallis test*

####

#### Appendix Table 2 (continued). The CCC indices at each District of Bac Ninh Province

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **D- Tien Du District** | **Total** | **Period** | **p-value \*** | **Multiple pairwise-comparison** |
| **Zero - COVID** | **Transition** | **New-normal** | **(1)****vs****(2)** | **(2)** **vs** **(3)** | **(1)** **vs** **(3)** |
| **(1)** | **(2)** | **(3)** | **p-value** | **p-value** | **p-value** |
| **(n=79)** | **(n=34)** | **(n=21)** | **(n=24)** |
|  **• Number of CCC per ward unit**  |
| Mean (95% CI) | 4 (3.4 - 4.6) | 2.4 (2.0 - 2.9) | 4.7 (3.6 - 5.8) | 5.6 (4.5 - 6.8) | **<0.001**  | **0.002**  | 0.25  | **<0.001**  |
| Median (Q1 - Q3) | 3 (2 - 6) | 2 (1 - 3) | 5 (4 - 6) | 5.5 (3 - 7) |
|  **• Length of CCC per ward unit**  |
| Mean (95% CI) | 5.6 (5.0 - 6.2) | 3.4 (2.9 - 3.8) | 1.5 (0.4 - 2.6) | 12.5 (11.3 - 13.6) | **<0.001**  | 0.32  | **<0.001**  | **<0.001**  |
| Median (Q1 - Q3) | 1 (1 – 6.5) | 1 (1 - 1) | 1 (1 - 1) | 14.5 (1 – 17.5) |
|  **• Number of confirm cases per CCC at each ward unit** |
| Mean (95% CI) | 7.7 (7.1 - 8.3) | 2.7 (2.3 -3.2) | 2 (0.8 - 3.1) | 19.8 (18.7 - 21.0) | **<0.001**  | 0.53  | **0.001**  | **0.001**  |
| Median (Q1 - Q3) | 2 (1 - 4) | 1.5 (1 - 4) | 1 (1 - 3) | 10 (2 - 19) |

*\* Kruskal-Wallis test*

####

#### Appendix Table 2 (continued). The CCC index at each District of Bac Ninh Province

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  **E- Tu Son Town** | **Total** | **Period** | **p-value \*** | **Multiple pairwise-comparison** |
| **Zero - COVID** | **Transition** | **New-normal** | **(1)****vs****(2)** | **(2)** **vs** **(3)** | **(1)** **vs** **(3)** |
| **(1)** | **(2)** | **(3)** | **p-value**  | **p-value**  | **p-value**  |
| **(n=89)** | **(n=42)** | **(n=28)** | **(n=19)** |
|  **• Number of CCC per ward unit**  |
| Mean (95% CI) | 4.8 (4.2 - 5.4) | 2.9 (2.4 - 3.4) | 6.2 (5.3 - 7.1) | 6.8 (5.5 - 8.2) | **<0.001** | **<0.001** | 0.51 | **<0.001** |
| Median (Q1 - Q3) | 4 (2 - 7) | 3 (1 - 4) | 7 (4 - 8) | 6 (4.5 - 9) |
|  **• Length of CCC per ward unit**  |
| Mean (95% CI) | 7.3 (6.7 - 7.9) | 4.2 (3.7 - 4.7) | 2 (1.1 - 2.9) | 21.8 (20.4 - 23.2) | **<0.001** | 0.11 | **<0.001** | **<0.001** |
| Median (Q1 - Q3) | 1 (1 - 11) | 1 (1 - 5) | 1 (1 - 1) | 17 (7 - 28) |
|  **• Number of confirm cases per CCC at each ward unit** |
| Mean (95% CI) | 17.5 (16.9 - 18.1) | 5.7 (5.2 - 6.2) | 4.5 (3.6 - 5.4) | 62.8 (61.5- 64.2) | **<0.001** | 0.49 | **<0.001** | **<0.001** |
| Median (Q1 - Q3) | 4 (1 - 10) | 3 (1 - 7) | 2.5 (1 - 6) | 33 (6 – 95.5) |

*\* Kruskal-Wallis test*

####

#### Appendix Table 2 (continued). The CCC index at each District of Bac Ninh Province

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **F- Thuan Thanh District** | **Total** | **Period** | **p-value \***  | **Multiple pairwise-comparison** |
| **Zero - COVID** | **Transition** | **New-normal** | **(1)** **vs** **(2)** | **(2)** **vs** **(3)** | **(1)** **vs** **(3)** |
| **(1)** | **(2)** | **(3)** | **p-value**  | **p-value**  | **p-value**  |
| **(n=92)** | **(n=45)** | **(n=13)** | **(n=34)** |
|  **• Number of CCC per ward unit**  |
| Mean (95% CI) | 3.4 (3.0 - 3.8) | 2.0(1.7 - 2.4) | 4.2 (3.2 - 5.2) | 4.8 (4.2 - 5.4) | **<0.001** | **<0.001**  | 0.21  | **<0.001**  |
| Median (Q1 - Q3) | 3 (2 - 5) | 2 (1 - 3) | 3 (3 - 5) | 4.5 (4 - 5) |
|  **• Length of CCC per ward unit**  |
| Mean (95% CI) | 10.2 (9.7 - 10.6) | 11.5 (11.2 - 11.9) | 1.1 (0.1- 2.1) | 11.8 (11.2 - 12.4) | **<0.001** | **0.006**  | **<0.001**  | 0.25  |
| Median (Q1 - Q3) | 4 (1 - 16) | 3 (1 - 19) | 1 (1 - 1) | 12 (3 - 17) |
|  **• Number of confirm cases per CCC at each ward unit**  |
| Mean (95% CI) | 10.8 (10.4 - 11.2) | 15.0 (14.7 - 15.4) | 1.4 (0.4 - 2.4) | 8.8 (8.2 - 9.4) | **<0.001** | **0.003**  | **<0.001**  | **0.043** |
| Median (Q1 - Q3) | 3 (1 - 9) | 3 (1 - 6) | 1 (1 - 1) | 6.5 (3 - 11) |

*\* Kruskal-Wallis test*

####  Appendix Table 2 (continued). The CCC indices at each District of Bac Ninh Province

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **G- Gia Binh District** | **Total** | **Period** | **p-value \*** | **Multiple pairwise-comparison** |
| **Zero - COVID** | **Transition** | **New-normal** | **(1)** **vs** **(2)** | **(2)** **vs****(3)** | **(1)** **vs** **(3)** |
| **(1)** | **(2)** | **(3)** | **p-value** | **p-value**  | **p-value**  |
| **(n=56)** | **(n=24)** | **(n=5)** | **(n=27)** |
|  **• Number of CCC per ward unit**  |
| Mean (95% CI) | 2.9 (2.5 - 3.3) | 1.9 (1.5 - 2.4) | 2.2 (1.5 - 2.9) | 3.9 (3.3 - 4.5) | **<0.001** | 0.39 | **0.028**  | **<0.001** |
| Median (Q1 - Q3) | 3 (2 - 4) | 2 (1 - 2) | 2 (2 - 3) | 4 (3 - 5) |
|  **• Length of CCC per ward unit** |
| Mean (95% CI) | 4.4 (4.0 - 4.8) | 3.3 (2.8 - 3.7) | 1.0(0.3 - 1.7) | 6.0(5.4 - 6.6) | **0.006** | 0.29 | **0.032**  | **0.031**  |
| Median (Q1 - Q3) | 1 (1 - 6) | 1 (1 - 1) | 1 (1 - 1) | 4 (1 - 10) |
|  **• Number of confirm cases per CCC at each ward unit** |
| Mean (95% CI) | 3.4 (3.0 - 3.8) | 2.1 (1.7 - 2. 6) | 1.0(0.3 - 1.7) | 5.0 (4.4 - 5.6) | **0.024** | 0.12  | **0.045**  | 0.12  |
| Median (Q1 - Q3) | 1 (1 - 3) | 1 (1 - 3) | 1 (1 - 1) | 2 (1 – 3.5) |

*\* Kruskal-Wallis test*

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#### Appendix Table 2 (continued). The CCC indices at each District of Bac Ninh Province

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **H- Luong Tai District** | **Total** | **Period** | **p-value \*** | **Multiple pairwise-comparison** |
| **Zero - COVID** | **Transition** | **New-normal** | **(1)** **vs** **(2)** | **(2)** **vs****(3)** | **(1)** **vs** **(3)** |
| **(1)** | **(2)** | **(3)** | **p-value** | **p-value**  | **p-value**  |
| **(n=56)** | **(n=24)** | **(n=5)** | **(n=27)** |
|  **• Number of CCC per ward unit**  |
| Mean (95% CI) | 2.8 (2.3 - 3.3) | 1.2 (0.9 - 1.5) | 2.4 (1.9 - 2.9) | 3.9 (3.2 - 4.6) | **<0.001** | **0.002** | **0.005** | **<0.001** |
| Median (Q1 - Q3) | 2.5 (1 - 4) | 1 (1 - 1) | 2 (2 - 3) | 4 (3 - 5) |
|  **• Length of CCC per ward unit** |
| Mean (95% CI) | 4.3 (3.8 - 4.8) | 4 (3.7 - 4.3) | 1.4 (0.9 - 1.9) | 6.8 (6.1 - 7.5) | **0.003** | 0.54  | **0.004**  | 0.10 |
| Median (Q1 - Q3) | 1 (1 - 5) | 1 (1 - 1) | 1 (1 - 1) | 4 (1 - 13) |
|  **• Number of confirm cases per CCC at each ward unit** |
| Mean (95% CI) | 4.1 (3.6 - 4.6) | 2.1 (1.8 - 2.4) | 2.4 (1.9 - 2.9) | 6.4 (5.7 - 7.1) | **0.047** | 0.79 | 0.08 | 0.08 |
| Median (Q1 - Q3) | 1.5 (1 - 4) | 1 (1 - 2) | 1 (1 - 3) | 3 (1 - 7) |

*\* Kruskal-Wallis test*

####

#### Appendix Table 2 (continued). The CCC indices at each District of Bac Ninh Province

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bac Ninh Province** | **Total** | **Period** | **p-value \*** | **Multiple pairwise-comparison** |
| **Zero - COVID** | **Transition** | **New-normal** | **(1)** **vs** **(2)** | **(2)** **vs****(3)** | **(1)** **vs** **(3)** |
| **(1)** | **(2)** | **(3)** | **p-value** | **p-value**  | **p-value**  |
| **(n=56)** | **(n=24)** | **(n=5)** | **(n=27)** |
|  **• Number of CCC per ward unit**  |
| Mean (95% CI) | 3.9 (3.7 - 4.0) | 2.3 (2.1 - 2.4) | 4.8(4.4 - 5.1) | 5.3(5.0 - 5.6) | **<0.001** | **<0.001** | **0.041** | **<0.001** |
| Median (Q1 - Q3) | 3(2 - 5) | 2 (1 - 3) | 4.5(3 - 6) | 5(3.5 - 7) |
|  **• Length of CCC per ward unit** |
| Mean (95% CI) | 7.8 (7.6 - 7.9) | 7.2 (7.0 - 7.3) | 1.9(1.6 - 2.3) | 13.2 (12.9 - 13.5) | **<0.001** | **<0.001**  | **<0.001**  | **<0.001**  |
| Median (Q1 - Q3) | 1(1 - 12) | 1(1 - 10) | 1(1 - 1) | 12(2 - 17) |
|  **• Number of confirm cases per CCC at each ward unit** |
| Mean (95% CI) | 13.1 (12.9 - 13.2) | 8.8(8.6 - 8.9) | 3.9 (3.5 - 4.2) | 26.0(25.6 - 26.3) | **<0.001** | **0.017** | **<0.001**  | **<0.001**  |
| Median (Q1 - Q3) | 3(1 - 8) | 2(1 - 5) | 1(1 - 4) | 6(2 - 16) |

*\* Kruskal-Wallis test*