

Title: Enhancing Affordability to Pharmaceuticals: Experience from the National Volume-Based Procurement (NVBP) in China

**Appendix Table 1: Characteristics of drugs included in the National Volume-Based Procurement (NVBP)**

| Number | Generic Names                      | Manufacturer  | Therapeutic Category <sup>a</sup>         | Included in the NEML | Specification          |
|--------|------------------------------------|---|---|----------------------|------------------------|
| #1     | Atorvastatin                       | Dezhan Healthcare                                     | Cardiovascular Agents                     | Yes                  | 20mg*7Tabs             |
| #2     | Rosuvastatin                       | Zhejiang Jingxin Pharmaceutical Co., Ltd.             | Cardiovascular Agents                     | Yes                  | 10mg*28Tabs            |
| #3     | Clopidogrel                        | Shenzhen Salubris Pharmaceuticals                     | Blood Products/Modifiers/Volume Expanders | Yes                  | 75mg*7Tabs             |
| #4     | Irbesartan                         | Zhejiang Huahai Pharmaceutical Co., Ltd.              | Cardiovascular Agents                     | No                   | 75mg*28Tabs            |
| #5     | Amlodipine                         | Zhejiang Jingxin Pharmaceutical Co., Ltd.             | Anticonvulsant                            | Yes                  | 5mg*28Tabs             |
| #6     | Entecavir                          | SinoBiopharmaceutical Co., Ltd                        | Antivirals                                | Yes                  | 0.5mg*28Tabs           |
| #7     | Escitalopram                       | Sichuan Kelun Pharmaceutical Co., Ltd.                | Antidepressants                           | Yes                  | 10mg*7Tabs             |
| #8     | Paroxetine                         | Zhejiang Huahai Pharmaceutical Co., Ltd.              | Antidepressants                           | Yes                  | 20mg*20Tabs            |
| #9     | Olanzapine                         | Jiangsu Hansoh Pharmaceutical Co., Ltd.               | Antipsychotics                            | Yes                  | 10mg*7Tabs             |
| #10    | Cefuroxime                         | Chengdu Brilliant Pharmaceutical Co., Ltd.            | Antibacterials                            | Yes                  | 0.25g*12Tabs           |
| #11    | Risperidone                        | Zhejiang Huahai Pharmaceutical Co., Ltd.              | Antipsychotics                            | Yes                  | 1mg*60Tabs             |
| #12    | Gefitinib                          | AstraZeneca (China) Pharmaceutical Co., Ltd.          | Antineoplastics                           | Yes                  | 250mg*10Tabs           |
| #13    | Fosinopril                         | Bristol-Myers Squibb (China) Pharmaceutical Co., Ltd. | Cardiovascular Agents                     | No                   | 10mg*14Tabs            |
| #14    | Irbesartan and Hydrochlorothiazide | Zhejiang Huahai Pharmaceutical Co., Ltd.              | Cardiovascular Agents                     | No                   | (150mg+12.5mg)*14 Tabs |
| #15    | Lisinopril                         | Zhejiang Huahai Pharmaceutical Co., Ltd.              | Cardiovascular Agents                     | Yes                  | 10mg*28Tabs            |
| #16    | Tenofovir Disoproxil Fumarate      | Chengdu Brilliant Pharmaceutical Co., Ltd.            | Antivirals                                | Yes                  | 300mg*30Tabs           |
| #17    | Losartan                           | Zhejiang Huahai Pharmaceutical Co., Ltd.              | Cardiovascular Agents                     | No                   | 50mg*14Tabs            |
| #18    | Enalapril                          | Yangtze River Pharmaceutical Group                    | Cardiovascular Agents                     | Yes                  | 10mg*16Tabs            |
| #19    | Levetiracetam                      | Zhejiang Jingxin Pharmaceutical Co., Ltd.             | Anticonvulsant                            | No                   | 250mg*30Tabs           |

| Number | Generic Names     | Manufacturer                               | Therapeutic Category <sup>a</sup> | Included in the NEML | Specification    |
|--------|-------------------|--|-----------------------------------|----------------------|------------------|
| #20    | Imatinib mesylate | Jiangsu Hansoh Pharmaceutical Co., Ltd.    | Antineoplastics                   | Yes                  | 100mg*60Tabs     |
| #21    | Montelukast       | Hangzhou Minsheng Pharmaceutical Co., Ltd. | Respiratory Tract Agents          | No                   | 10mg*5Tabs       |
| #22    | Smectite          | Jiangsu Simcere Pharmaceutical Co., Ltd.   | Gastrointestinal Agents           | Yes                  | 3g*15Packets     |
| #23    | Pemetrexed        | Sichuan Huiyu Pharmaceutical Co., Ltd.     | Antineoplastics                   | Yes                  | 500mg/Containers |
|        | Pemetrexed        | Sichuan Huiyu Pharmaceutical Co., Ltd.     | Antineoplastics                   | Yes                  | 100mg/Containers |
| #24    | Flurbiprofen      | Sino-Biopharmaceutical Limited             | Anti-inflammatory Agents          | No                   | 5ml:50mg*5Vials  |
| #25    | Dexmedetomidine   | Yangtze River Pharmaceutical Group         | Sedatives/Hypnotics               | No                   | 2ml:0.2mg*4Vials |

a. Classified according to the USP Therapeutic Categories Model Guidelines.

**Appendix Table 2: Price changes of selected drugs after National Volume-Based Procurement (NVBP)**

| Generic Names                      | Price before NVBP |                  | Price after NVBP |                  | Price change |
|------------------------------------|-------------------|------------------|------------------|------------------|--------------|
|                                    | CNY               | USD <sup>a</sup> | CNY              | USD <sup>a</sup> |              |
| Atorvastatin                       | 39.48             | 6.03             | 6.60             | 1.01             | 83.28%       |
| Rosuvastatin                       | 125.44            | 19.15            | 21.80            | 3.33             | 82.62%       |
| Clopidogrel                        | 60.33             | 9.21             | 22.26            | 3.40             | 63.10%       |
| Irbesartan                         | 56.56             | 8.64             | 5.66             | 0.86             | 89.99%       |
| Amlodipine                         | 7.38              | 1.13             | 4.16             | 0.64             | 43.63%       |
| Entecavir                          | 239.40            | 36.55            | 17.36            | 2.65             | 92.75%       |
| Escitalopram                       | 42.49             | 6.49             | 30.94            | 4.72             | 27.18%       |
| Paroxetine                         | 63.80             | 9.74             | 33.40            | 5.10             | 47.65%       |
| Olanzapine                         | 95.69             | 14.61            | 67.51            | 10.31            | 29.45%       |
| Cefuroxime                         | 10.31             | 1.57             | 6.16             | 0.94             | 40.25%       |
| Risperidone                        | 49.80             | 7.60             | 10.02            | 1.53             | 79.88%       |
| Gefitinib                          | 2280.00           | 348.09           | 547.00           | 83.51            | 76.01%       |
| Fosinopril                         | 39.66             | 6.05             | 11.80            | 1.80             | 69.79%       |
| Irbesartan and Hydrochlorothiazide | 61.74             | 9.43             | 15.26            | 2.33             | 75.28%       |
| Lisinopril                         | 32.48             | 4.96             | 6.45             | 0.98             | 80.14%       |
| Tenofovir Disoproxil Fumarate      | 460.80            | 70.35            | 17.72            | 2.71             | 96.15%       |
| Losartan                           | 29.96             | 4.57             | 14.70            | 2.24             | 50.93%       |
| Enalapril                          | 19.84             | 3.03             | 8.93             | 1.36             | 54.99%       |
| Levetiracetam                      | 90.60             | 13.83            | 72.00            | 10.99            | 20.53%       |
| Imatinib mesylate                  | 843.00            | 128.70           | 632.82           | 96.61            | 24.93%       |
| Montelukast*                       | –                 | –                | 19.38            | 2.96             | –            |
| Smectite                           | 29.70             | 4.53             | 10.20            | 1.56             | 65.66%       |
| Pemetrexed (500 ml)                | 9600.00           | 1465.65          | 2776.97          | 423.96           | 71.07%       |
| Pemetrexed (100 ml)                | 2800.00           | 427.48           | 810.00           | 123.66           | 71.07%       |
| Flurbiprofen                       | 311.08            | 47.49            | 109.75           | 16.76            | 64.72%       |
| Dexmedetomidine                    | 748.00            | 114.20           | 532.00           | 81.22            | 28.88%       |

\*Price for montelukast is not available before the NVBP.

a. The exchange rate was 1 USD = 6.55 CNY

**Appendix Table 3 : Medication affordability of selected drugs after the National Volume-Based Procurement (NVBP)**

| Generic Names                      | Defined daily dose (DDD) <sup>a</sup> | Treatment duration (days) <sup>b</sup> | Affordability (daily wage) <sup>c</sup> |       |                    |       |                    |       |
|------------------------------------|---------------------------------------|--|---|-------|--------------------|-------|--------------------|-------|
|                                    |                                       |  | Overall <sup>c</sup>                    |       | Rural <sup>d</sup> |       | Urban <sup>e</sup> |       |
|                                    |                                       |  | Before                                  | After | Before             | After | Before             | After |
| Atorvastatin                       | 20mg                                  | 30                                     | 1.38                                    | 0.23  | 2.64               | 0.44  | 0.99               | 0.17  |
| Rosuvastatin                       | 10mg                                  | 30                                     | 1.09                                    | 0.18  | 2.10               | 0.34  | 0.79               | 0.13  |
| Clopidogrel                        | 75mg                                  | 30                                     | 2.10                                    | 0.78  | 4.03               | 1.49  | 1.52               | 0.56  |
| Irbesartan                         | 150mg                                 | 30                                     | 0.99                                    | 0.10  | 1.89               | 0.19  | 0.71               | 0.07  |
| Amlodipine                         | 5mg                                   | 30                                     | 0.06                                    | 0.04  | 0.12               | 0.07  | 0.05               | 0.03  |
| Entecavir                          | 0.5mg                                 | 30                                     | 2.09                                    | 0.15  | 4.00               | 0.29  | 1.51               | 0.11  |
| Escitalopram                       | 10mg                                  | 30                                     | 1.48                                    | 1.08  | 2.84               | 2.07  | 1.07               | 0.78  |
| Paroxetine                         | 20mg                                  | 30                                     | 0.78                                    | 0.41  | 1.49               | 0.78  | 0.56               | 0.29  |
| Olanzapine                         | 10mg                                  | 30                                     | 3.34                                    | 2.35  | 6.40               | 4.52  | 2.41               | 1.70  |
| Cefuroxime                         | 0.5g                                  | 7                                      | 0.10                                    | 0.06  | 0.19               | 0.11  | 0.07               | 0.04  |
| Risperidone                        | 5mg                                   | 30                                     | 1.01                                    | 0.20  | 1.94               | 0.39  | 0.73               | 0.15  |
| Gefitinib                          | 250mg                                 | 30                                     | 55.64                                   | 13.35 | 106.74             | 25.61 | 40.20              | 9.64  |
| Fosinopril                         | 15mg                                  | 30                                     | 1.04                                    | 0.31  | 1.99               | 0.59  | 0.75               | 0.22  |
| Irbesartan and Hydrochlorothiazide | 150mg+<br>12.5mg                      | 30                                     | 1.08                                    | 0.27  | 2.06               | 0.51  | 0.78               | 0.19  |
| Lisinopril                         | 10mg                                  | 30                                     | 0.28                                    | 0.06  | 0.54               | 0.11  | 0.20               | 0.04  |
| Tenofovir Disoproxil Fumarate      | 245mg                                 | 30                                     | 3.75                                    | 0.14  | 7.19               | 0.28  | 2.71               | 0.10  |
| Losartan                           | 50mg                                  | 30                                     | 0.52                                    | 0.26  | 1.00               | 0.49  | 0.38               | 0.19  |
| Enalapril                          | 10mg                                  | 30                                     | 0.30                                    | 0.14  | 0.58               | 0.26  | 0.22               | 0.10  |
| Levetiracetam                      | 1.5g                                  | 30                                     | 4.42                                    | 3.51  | 8.48               | 6.74  | 3.19               | 2.54  |
| Imatinib mesylate                  | 400mg                                 | 30                                     | 13.71                                   | 10.30 | 26.31              | 19.75 | 9.91               | 7.44  |
| Montelukast*                       | 10mg                                  | 30                                     | –                                       | 0.95  | –                  | 1.81  | –                  | 0.68  |
| Smectite                           | 9g                                    | 7                                      | 0.56                                    | 0.12  | 1.08               | 0.22  | 0.41               | 0.08  |
| Pemetrexed                         | 500mg                                 | 1                                      | 78.09                                   | 22.59 | 149.81             | 43.34 | 56.42              | 16.32 |
| Pemetrexed                         | 100mg                                 | 1                                      | 22.78                                   | 6.59  | 43.70              | 12.64 | 16.46              | 4.76  |
| Flurbiprofen                       | 0.2g                                  | 1                                      | 2.02                                    | 0.71  | 3.88               | 1.37  | 1.46               | 0.52  |
| Dexmedetomidine                    | 1mg                                   | 1                                      | 7.61                                    | 5.41  | 14.59              | 10.38 | 5.49               | 3.91  |

a. The DDD of each drug was obtained from the WHO DDD index web page (WHO Collaborating Centre for Drug Statistics Methodology, 2020). For antineoplastics without the DDD values, the minimum dose from to the package insert was used.

b. The treatment course was defined as 30 days for chronic diseases and 7 days for symptom relief.

c. According to WHO/HAI standard, medication affordability was compared between the cost for a treatment course and the extra daily wages (EDW) for the lowest paid unskilled government worker. Since EDW is not available in China, based on previous research, average disposable daily income per capita was used. Average disposable annual salary was obtained from China Statistical Yearbook:2019 (30,733 CNY per capita). The working day in 2019 in China was 250 days, and the overall disposable daily income per capita was 122.93 CNY.

d. Disposable daily income per capita of all rural residents, 64.08 CNY.

e. Disposable daily income per capita of all urban residents, 170.16 CNY.

\*Price for montelukast is not available before the NVBP.

**Appendix Table 4: Comparison of price of selected drugs after National Volume-Based Procurement (NVBP) with U.S**

| Generic names                      | Price in China, USD |                | Price in US, USD <sup>a</sup> |
|------------------------------------|---------------------|----------------|-------------------------------|
|                                    | Before the NVBP     | After the NVBP |                               |
| Atorvastatin                       | 6.03                | 1.01           | 0.67                          |
| Rosuvastatin                       | 19.15               | 3.33           | 4.53                          |
| Clopidogrel                        | 9.21                | 3.40           | 2.89                          |
| Irbesartan                         | 8.64                | 0.86           | 12.26                         |
| Amlodipine                         | 1.13                | 0.64           | 1.28                          |
| Entecavir                          | 36.55               | 2.65           | 120.00                        |
| Escitalopram                       | 6.49                | 4.72           | 1.89                          |
| Paroxetine                         | 9.74                | 5.10           | 51.98                         |
| Olanzapine                         | 14.61               | 10.31          | 92.51                         |
| Cefuroxime                         | 1.57                | 0.94           | 49.50                         |
| Risperidone                        | 7.60                | 1.53           | 91.55                         |
| Gefitinib <sup>b</sup>             | 348.09              | 83.51          | 3115.55                       |
| Fosinopril                         | 6.05                | 1.80           | 4.54                          |
| Irbesartan and Hydrochlorothiazide | 9.43                | 2.33           | 9.36                          |
| Lisinopril                         | 4.96                | 0.98           | 1.79                          |
| Tenofovir Disoproxil Fumarate      | 70.35               | 2.71           | 109.57                        |
| Losartan                           | 4.57                | 2.24           | 2.38                          |
| Enalapril                          | 3.03                | 1.36           | 4.07                          |
| Levetiracetam                      | 13.83               | 10.99          | 10.35                         |
| Imatinib mesylate                  | 128.70              | 96.61          | 245.47                        |
| Montelukast                        | –                   | 2.96           | 1.98                          |
| Smectite                           | 4.53                | 1.56           | –                             |
| Pemetrexed (500 ml)                | 1465.65             | 423.96         | 4527.40                       |
| Pemetrexed (100 ml)                | 427.48              | 123.66         | 905.48                        |
| Flurbiprofen                       | 47.49               | 16.76          | –                             |
| Dexmedetomidine                    | 114.20              | 81.22          | –                             |

a. The package price of each drug in the United States was calculated using the lowest average wholesale unit price of each drug obtained from the IBM Micromedex Redbook.

b. There is currently no generic drugs for gefitinib in the United States. Therefore, the price for the brand-name drugs was used.

**Appendix Table 5: Comparison of affordability of selected drugs after National Volume-Based Procurement (NVBP) with U.S**

| Generic names                      | Affordability in China (daily wage) <sup>a</sup> |                | Affordability in U.S. (daily wage) <sup>b</sup> |
|------------------------------------|--|----------------|---|
|                                    | Before the NVBP                                  | After the NVBP |   |
| Atorvastatin                       | 1.38   | 0.23           | 0.02  |
| Rosuvastatin                       | 1.09   | 0.18           | 0.03  |
| Clopidogrel                        | 2.10   | 0.78           | 0.07  |
| Irbesartan                         | 0.99   | 0.10           | 0.15  |
| Amlodipine                         | 0.06   | 0.04           | 0.01  |
| Entecavir                          | 2.09   | 0.15           | 0.71  |
| Escitalopram                       | 1.48   | 1.08           | 0.04  |
| Paroxetine                         | 0.78   | 0.41           | 0.43  |
| Olanzapine                         | 3.34   | 2.35           | 2.20  |
| Cefuroxime                         | 0.10   | 0.06           | 0.32  |
| Risperidone                        | 1.01   | 0.2            | 1.27  |
| Gefitinib <sup>c</sup>             | 55.64  | 13.35          | 51.79   |
| Fosinopril                         | 1.04   | 0.31           | 0.08  |
| Irbesartan and Hydrochlorothiazide | 1.08   | 0.27           | 0.11  |
| Lisinopril                         | 0.28   | 0.06           | 0.01  |
| Tenofovir Disoproxil Fumarate      | 3.75   | 0.14           | 0.61  |
| Losartan                           | 0.52   | 0.26           | 0.03  |
| Enalapril                          | 0.30   | 0.14           | 0.04  |
| Levetiracetam                      | 4.42   | 3.51           | 0.34  |
| Imatinib mesylate                  | 13.71  | 10.3           | 2.72  |
| Montelukast                        | –  | 0.95           | 0.07  |
| Smectite                           | 0.56   | 0.12           | –   |
| Pemetrexed (500 ml)                | 78.09  | 22.59          | 25.08   |
| Pemetrexed (100 ml)                | 22.78  | 6.59           | 5.02  |
| Flurbiprofen                       | 2.02   | 0.71           | –   |
| Dexmedetomidine                    | 7.61   | 5.41           | –   |

a. Average disposable annual salary was obtained from China Statistical Yearbook:2019 (30,733 CNY per capita). The working day in mainland China was 250 days in 2019, and the overall disposable daily income per capita was 18.8 USD (Exchange rate: 1 USD = 6.55 CNY).

b. Average disposable annual salary was obtained from <https://fred.stlouisfed.org/series/A229RX0> (45,302 USD per capita). The working day in United States was 251 days in 2019, and the overall disposable daily income per capita was 180.5 USD.