**Urban Noise Pollution Assessment and its Non-Auditory Health Effects on Residents of Chiniot and Jhang, Punjab, Pakistan**

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**Supplementary data**

**Table S1:** Noise pollution level and traffic frequency at educational institutes and hospitals of Jhang and Chiniot.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Educational institutes of Jhang** | **dB** | **Tf** | **Educational institutes of Chiniot** | **dB** | **Tf** |
| Allied School System | 89 | 2494 | Govt. Islamia High School | 83 | 2046 |
| Beaconhouse School System | 91 | 2585 | Dar e Arqam School | 83 | 1965 |
| Garrison School System | 93 | 2365 | The Smart School | 84 | 2143 |
| The City School | 88 | 2354 | Allied School | 78 | 1705 |
| Govt. Islamia Higher Secondary School | 78 | 2053 | Oxford Public Model High School | 89 | 1586 |
| Govt. MB High School | 92 | 2342 | Aisha Memorial Public High School | 91 | 2135 |
| Faran College | 97 | 2532 | Govt. Girls High School | 75 | 1578 |
| Govt. Model High School | 74 | 2324 | Govt. Islah High School | 73 | 1487 |
| Ghazali Pilot Schools | 89 | 2474 | TCF School | 89 | 2376 |
| Govt. Girls High School | 82 | 2484 | Bright Star Public Model School | 93 | 2586 |
| Chenab College | 83 | 2354 | Sibling Public School | 81 | 2254 |
| Lahore College for Women University | 90 | 1547 | Misali Zakariya Science High School  | 87 | 2375 |
| Rachna College of Commerce | 89 | 1426 |  |  |  |
| Govt. Postgraduate College | 95 | 2135 |  |  |  |
| Millat College | 98 | 1743 |  |  |  |
| Saifia Polytechnic Institute | 103 | 2539 |  |  |  |
| Ghazali College | 77 | 2125 |  |  |  |
| Vocational Training Institute | 81 | 2134 |  |  |  |
| **Mean** | **88** | **2222** | **Mean** | **83** | **2019** |
| **Std. Dev.** | **7.80** | **341.8** | **Std. Dev.** | **6.30** | **360.1** |
| **N** | **18** | **N** | **12** |
| **Hospitals of Jhang** | **Hospitals of Chiniot** |
| Civil Hospital, Gojra Rd | 84 | 3194 | Islamia hospital | 91 | 2975 |
| District TB Hospital, Gojra Rd | 89 | 3398 | Harral Medical Complex | 86 | 2754 |
| Faisal Mighiana Memorial Hospital, Gojra Rd | 67 | 1698 | Lillah hospital | 86 | 2857 |
| Iqbal memorial hospital, Bhakkar Rd | 67 | 1487 | Ali Hospital | 97 | 3086 |
| Chenab Medicare, Gojra Rd | 56 | 1293 | Khadija Tul Kubra Hospital | 88 | 2576 |
| Ismail Welfare Hospital, Gojra Rd | 53 | 1496 | Kareem Bibi hospital | 79 | 2543 |
| Nighat Medical Complex, Gojra Rd | 46 | 1294 | Fazl e Omar Hospital | 90 | 2646 |
| Rana Hospital, Ayub Chowk | 56 | 1384 | Eesha Medical Centre | 98 | 2675 |
| Shifa Medical Centre, Civil lines | 46 | 1493 | Pakistan Anti Goiter & Patients Welfare Services | 99 | 3127 |
| Shahabal Polyclinic, Gojra Rd | 76 | 2032 | DHQ Hospital | 78 | 2453 |
| **Mean** | **64** | **1877** | **Mean** | **89** | **2769** |
| **Std. Dev.** | **15.2** | **779.7** | **Std. Dev.** | **7.3** | **233.6** |
| **N** | **10** | **N** | **10** |

**Table 2S Noise pollution level and traffic frequency at commercial and industrial areas of Jhang and Chiniot**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Commercial places of Jhang** | **dB** | **Tf** | **Commercial places of Chiniot** | **dB** | **Tf** |
| Sabz Mandi | 89 | 3497 | Ameen Marbles | 85 | 2254 |
| Ghalla Mandi | 87 | 3276 | Usmania Hotel | 85 | 2105 |
| Jhang Bazar | 84 | 3593 | Shahid Ali mujhaid Ali and brothers  | 80 | 1734 |
| Rail Bazar | 86 | 3247 | Azeem Ice Bar & Burger | 120 | 4201 |
| Anarkali Bazar | 87 | 4294 | SK Peteroleum | 80 | 2950 |
| Chambeli Market, Near Rail Bazar | 78 | 3138 | Galla Mandi Market plaza | 75 | 2236 |
|  |  |  | NADRA OFFICE | 70 | 1724 |
|  |  |  | Lucky Mall | 120 | 3872 |
|  |  |  | Master Zafar's Handicraft Factory | 107 | 3402 |
|  |  |  | FFC Office & Warehouse | 78 | 2041 |
|  |  |  | Hasnain Karyana Store | 111 | 3492 |
|  |  |  | Daniyal Cooling Center | 72 | 1758 |
|  |  |  | Sunara Bazart | 78 | 1335 |
| **Mean** | **85** | **3507** | **Mean** | **89** | **2546** |
| **Std. Dev.** | **3.80** | **420.4** | **Std. Dev.** | **18.28** | **928.3** |
| **N** | **6** | **N** | **13** |
| **Industrial area of Jhang** | **Industrial area of Chiniot** |
| Hafiz Rice Mills | 98 | 3402 | Janjua Agro-Industry | 78 | 3044 |
| Umer Usman Surgical Cotton Industry | 81 | 2439 | Madina Group of Industries | 82 | 4241 |
| Mohsin Ehsan Group of Industries | 87 | 2143 | Bismillah Textiles | 84 | 3042 |
| Fawad Ghee Industries | 74 | 1587 | Shan Industries | 83 | 2705 |
| Chadhar Group of Industries | 82 | 1683 | Iqbal Rice Mills | 95 | 3036 |
| Shakarganj Mills Ltd. | 79 | 1643 | Sohni Dharti Weaving Industries | 88 | 3505 |
| Zafar Javed Zarai Industries | 85 | 1798 | Kashmir Wood Industries (Pvt) Ltd. | 98 | 3023 |
| Ittefaq Flour Mills | 95 | 1853 |  |  |  |
| **Mean** | **85** | **2068** | **Mean** | **86** | **3228** |
| **Std. Dev.** | **8.00** | **609.7** | **Std. Dev.** | **7.20** | **503.9** |
| **N** | **8** | **N** | **7** |

**Table S3 Noise pollution level and traffic frequency at traffic intersections of sampling areas in Jhang and Chiniot**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Traffic intersections of Jhang** | **dB** | **Tf** | **Traffic intersections of Chiniot** | **dB** | **Tf** |
| Ayub Chowk | 95 | 2684 | Sargodha Faisalabad Road bypass | 100 | 3243 |
| Fowara Chowk | 93 | 2594 | Rajoa Chock | 100 | 3252 |
| Rail Bazar Chowk | 97 | 3082 | Tehsil Chowk | 110 | 4032 |
| Thana Sadr Chowk | 95 | 3135 | Chock Shaheed | 115 | 3603 |
| Abbot Pur Chowk  | 94 | 2967 | Nao Gazah Road | 85 | 3095 |
| Station Chowk | 91 | 3026 | Salara Road | 95 | 3349 |
| Adhiwal Chowk | 90 | 2703 | Riaz Shah Road | 70 | 2042 |
| Khokha Chowk | 102 | 3406 | Tibba Kamangran Road | 70 | 1830 |
| Nawaz Chowk | 94 | 2896 | Lahore Faisalabad Bypass | 95 | 2986 |
| Chiniot More | 81 | 2195 | Salara Chock | 110 | 3402 |
| Katchehry Chowk | 95 | 3205 | Umer Road | 100 | 3198 |
| Katchehry Rd | 98 | 1894 | Sargodha Road | 101 | 3894 |
| Toba Rd | 75 | 3255 | Chiniot Ring Road | 79 | 1492 |
| Gojra Rd | 96 | 3739 | Ahmad Yousaf Shaheed Road | 83 | 2304 |
| Dhajji Rd | 73 | 2020 | Jogianwala water pump | 102 | 3014 |
| Shaheed Rd | 97 | 3298 | Rodian Wala Road | 78 | 2302 |
| Kotwali Rd | 89 | 3104 | Main Sargodha Road | 102 | 3103 |
| Yousuf Shah Rd | 95 | 3082 |  |  |  |
| Sargodha Rd | 78 | 3194 |  |  |  |
| Jhang Rd | 96 | 2867 |  |  |  |
| Chiniot Rd | 59 | 3124 |  |  |  |
| Faisalabad Rd | 68 | 2853 |  |  |  |
| Chiniot Rd, Chiniot More | 76 | 3395 |  |  |  |
| Satellite Town Rd, Chiniot More | 65 | 2840 |  |  |  |
| Faisalabad Rd, Chiniot More | 72 | 3031 |  |  |  |
| Jhang Rd, Chiniot More | 83 | 3024 |  |  |  |
| Adhiwal, Sargodha Rd | 78 | 1985 |  |  |  |
| Daewoo Stand, Jhang Rd | 89 | 1793 |  |  |  |
| Purani Chungi | 78 | 2042 |  |  |  |
| Lorry Addah, Jhang | 95 | 3014 |  |  |  |
| Ganda Toyah | 83 | 3103 |  |  |  |
| Faisalabad-Jhang Rd Railway Phatak | 89 | 2987 |  |  |  |
| Darul Sakina Rd, Near Satellite Town | 98 | 3603 |  |  |  |
| Jhang City Railway Station | 78 | 3454 |  |  |  |
| **Mean** | **86** | **2899** | **Mean** | **93** | **2949** |
| **Std. Dev.** | **11.0** | **494.4** | **Std. Dev.** | **13.80** | **715.1** |
| **N** | **34** | **N** | **17** |

**Table S4** Noise pollution level and traffic frequency at Residential, Religious and Recreational areas of Jhang and Chiniot.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Residential areas of Jhang** | **dB** | **Tf** | **Residential areas of Chiniot** | **dB** | **Tf** |
| Rehman Garden, Faisalabad Rd | 55 | 1689 | Satellite Town | 103 | 1643 |
| Madina Town, Jhang Rd | 71 | 1684 | Model Town | 92 | 1456 |
| Satellite Town, Gojra Road | 88 | 2856 | Green Wood Town | 100 | 2332 |
| Chandan Wala Mohallah | 58 | 1475 | Ghafoor Abad | 93 | 2154 |
| Mohallah Hasnana, Jhang | 56 | 1593 | Mohallah Lahori Gate | 88 | 2212 |
| Mohallah Marzi Pura | 61 | 2395 | Rasta Mohallah | 83 | 2521 |
| Pindi Mohallah | 65 | 2353 | Mohallah Peer Shah Burhan | 91 | 1524 |
| Bhabhrana Mohallah | 89 | 2683 | Mohallah Kamangran | 73 | 1531 |
| Budha Mohallah | 83 | 2895 | New Abadi | 78 | 1437 |
| Sheikh Lahori | 77 | 2894 | Mohallah Aali | 82 | 1053 |
| Sultan Wala Mohallah | 89 | 3104 |  |  |  |
| Talab Committee, Jhang | 76 | 2462 |  |  |  |
| Basheer Colony, Hasnana | 75 | 2742 |  |  |  |
| Darbar Mai Chhalla wala, Hasnana | 73 | 2593 |  |  |  |
| Officer Colony | 49 | 1464 |  |  |  |
| Judicial Colony | 54 | 1596 |  |  |  |
| Piplianwala Mohallah | 78 | 2484 |  |  |  |
| Mohallah Burji Wala  | 78 | 2693 |  |  |  |
| **Mean** | **70** | **2314** | **Mean** | **88** | **1786** |
| **Std. Dev.** | **12.8** | **565.7** | **Std. Dev.** | **9.40** | **480.4** |
| **N** | **18** | **N** | **10** |
| **Religious and Recreational areas of Jhang** | **Religious and Recreational areas of Chiniot** |
| Jhang Art Gallery | 76 | 1784 | Badshahi Mosque | 80 | 2895 |
| Masjid Haq Nawaz Shaheed | 78 | 2553 | Shalimar Park | 65 | 1498 |
| Majeed Amjid Park, Katchehry Chowk | 62 | 2575 | Chiniot Golf Club | 60 | 1458 |
| Company Bagh | 54 | 1987 | Rao Bagh, Lahore Road  | 75 | 1894 |
| Nawaz Shareef Park, Jhang City | 39 | 1864 | Saeen Sukh Shrine | 95 | 3391 |
| Jameel Shaheed Park | 47 | 293 | Hockey Stadium, Satellite town | 91 | 2493 |
| Forest Park | 51 | 757 | Jamia Masjid Noor | 79 | 1462 |
| Darbar Mai Heer | 67 | 2894 | Masjid Siddique-e-Akbar Hanfi  | 85 | 2532 |
| Bilal Markaz | 71 | 2153 | Din Garden Chock | 94 | 2403 |
| **Mean** | **60** | **1873** | **Mean** | **80** | **2225** |
| **Std. Dev.** | **13.5** | **854.3** | **Std. Dev.** | **12.3** | **690.5** |
| **N** | **9** | **N** | **9** |