**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** | |