PLOS ONE

Self-reported illnesses in Thatta: Evidence from a rural and underdeveloped district in Sindh province, Pakistan

--Manuscript Draft--

Manuscript Number:	PONE-D-23-33013
Article Type:	Research Article
Full Title:	Self-reported illnesses in Thatta: Evidence from a rural and underdeveloped district in Sindh province, Pakistan
Short Title:	Disease epidemiology of Pakistan
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Keywords:	Self-reported Illnesses, Disease prevalence, Multiple Morbidities, determinants of health, Health surveys, Cross sectional studies
Abstract:	Introduction: Profiling of Self-reported illnesses (SRI) is widely used to aid priority settings in the health sector in low- and low-middle-income countries. The common source of SRI data comes from National/sub-national level surveys. However, many surveys focus on maternal and child health, and few infectious illnesses or illnesses-specific surveys. We provide complete illness profiling including chronic, infectious, and other illnesses in District Thatta. Methods: A district-level survey was conducted in Thatta in 2019. A population-representative sample of all ages (n=7776) was drawn in urban and rural areas in four Talukas in Thatta. Survey questions include SRI from the respondents, confirmed by a prescription or other relevant documents. Prevalence was estimated for major and minor illnesses. Prevalence ratios were estimated for gender, age, and urban areas with a Generalized Linear Model of the Poisson family. Factors such as age, gender, poverty, and rural inhabitation contributing to multiple morbidities were explored by Zero-Inflated Poison Distribution. Findings: 36.57% of the respondents to the survey reported at least one SRI. Prevalence of communicable illnesses was 20.7%, followed by non-communicable illnesses (4.8%), Gastrointestinal disorders (4.4%), and injuries/disabilities (1.9%). Urban inhabitants were more likely to have Chronic Obstructive Pulmonary Disorders (3.34, CIs 2.26-4.92) and Diabetes (1.62, CIs 0.91-2.91). Females were most likely to have injuries (1.20, CIs 0.71-2.03), disabilities (1.59, Cis 0.91-2.79), and Musculoskeletal Disorders (1.25, CIs 0.85-1.82). Children aged < 1 year (0.80, CIs 0.63-0.96) and elderly >65 years (0.78, CIs 0.56-1.01) were more likely to have comorbidities and rural inhabitants were less likely to have comorbidities (-0.51, CIs -0.59- -0.44). Discussion: The findings of this research serve as a tool for priority settings in the health sector by the district health administration. For multiple reasons, our estimates of disease burden are higher and are more comprehensive than the current evidence of health seeking in Thatta district and in Sindh province. We could not synthesize variation in over prevalence of SRIs or any specific SRI in the studies included in this review that is due to differences in survey settings or design effects. Seasonal variation of diseases was also not considered as the data was collected in the spring season. Recommendation and conclusion: The burden of disease data is not routinely collected in Pakistan due to resource constraints while health surveys funded by the development partners focus on infectious diseases and maternal and child health. Our findings are timely and set an example for documenting a complete disease profile.
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Title

Self-reported illnesses in Thatta: Evidence from a rural and underdeveloped district in Sindh province, Pakistan

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Wordcount

3046 excluding tables and figures

Acknowledgment

We gratefully acknowledge the World Health Organization, Regional Office, Eastern Mediterranean Region for providing funding for this survey. Our acknowledgments are due to the field staff of the survey for their contributions to the survey and to the officials of the district health office, Thatta for their logistic support.

1. Introduction

Compared to clinical diagnosis, Self-Reported Illnesses (SRI) are a quick and low-cost alternative for estimating the disease burden in low- and low-middle-income countries (LMICs). In many LMICs, disease patterns using the SRI framework are commonly analysed, albeit at a small scale (Giang and Allebeck et al 2003; Rehman and Gilmour et al, 2013). In Pakistan the health sector devolved to the provinces in 2010 and the demand for devolution of the health sector to the district level is growing in popularity (Suhail and Gohar et al, 2022). However, one of the major handicaps of the district administration is their limited capacity for devolved decision-making often aggravated by limited local evidence (Ali ,2018).

A rural health program was launched in Thatta district in 2017 to prototype the collaboration of academia and the district health administration. The Department of Community Health Sciences, Aga Khan University, and the District Health Office agreed to develop a partnership to accelerate efforts to improve access and use of district health services in Thatta (Abbasi and Siddiqi et al, 2021). Inception reports of RHP highlighted limited evidence as one of the reasons for weak planning and management of health services in the district (Rural Health Programme 2018). The Rural Health program planned a survey to provide district-level estimates of the complete disease profile with a population-representative sample of district Thatta.

2. Methods

2.1 Survey Settings

Thatta is an underdeveloped district in Sindh province in Pakistan. It is situated on the coastline in Lower Sindh, Pakistan (Figure 1). In the census of 2017, the population of district Thatta was 979817, the male population was 52.1% and the population density was 100/km^2.

Over 80% of the population (approximately 0.98 million), lives in rural areas (PBS, 2019), and mainly relies on agriculture and fishery for living. On the Human Development Index, it is ranked amongst the lowest: 90th out of 111 districts at the national level and 22nd among 23 districts in Sindh (NIPS, 2018). The Health Status and health-seeking patterns of the population are not so different from the Human Development Index ranking of Thatta. For example, it was ranked amongst the highest in Sindh province in terms of under-five mortality (129 deaths per 10000 live births) and malnutrition (55%) and lowest for childhood vaccination (37% of children aged 1-2 years are fully immunized). Like the national situation, the disease profile of district Thatta is limited to maternal and child health, immunization, and unknown common illnesses. The objective of the survey was to provide a full disease profile representative of district and sub-district representative levels of Thatta district.

2.2 Survey Design and Data Collection

Sample size was drawn on assuming a design effect of 1.5, a standard deviation (PKR 15300) of demand for healthcare in rural Sindh, and margin of error of 1000, and a 10% refusal rate, the final sample size of the survey was 1060 households. Multistage cluster sampling was used with a stratification strategy. This sample was distributed through sampling proportionate to population among sub-districts/Talukas (Stratum) of Thatta namely 1) Thatta, 2) Mirpur Sakro, 3) Keti Bundar, 4) Ghorabari and 5) Kharo Chann: the latter two being managed jointly (Figure 1). Each sub-district was divided into rural and urban domains (PBS, 2014). Rural and urban classification was carried out using the definition of rural union council and urban wards by the district administration of Thatta district. The primary sampling units were obtained from Union Councils and Wards in rural and urban areas respectively. Three primary sampling units (Village in Rural areas and Mohalla/street in

Urban were selected at random in each UC/Ward. In each primary sampling unit, 8-12 households (secondary sampling units) were included in the survey.

The survey questionnaire included demographic information and self-reported illness from each member of the household. Data was collected from the female and male head of the households by the male and female members of data collection teams respectively. Data was collected on a tablet using an online data collection tool namely Epi-collect, provided freely by the London School of Hygiene and Tropical Medicine (Centre for Genomic Pathogen Surveillance). SRIs were divided across sub-classifications of diseases, Communicable Diseases, Mental Health and Non-Communicable diseases, Gastrointestinal and Liver disorders, Injuries and Disabilities, Gynaecological and Obstetrics Disorders and others/unclassified Disorders. Data for CDs was collected based on past month recall, while data on NCDs were recorded if the respondent reported it at the time of the survey. Data collection started. In January 2019 and completed by April 2019.

Data was collected by trained enumerators comprising a male and a female in each team. There were eight such teams and a data collection supervisor. The data collectors were trained on data collection methods, cultural and religious sensitivities, type and classification of diseases and use of Computer Tablet to enter data in the field. Data collection was carried out in the months of January to April 2019.

Data validation included two strategies 1) weekly field visits to aid the data enumerators and directly contacting the randomly picked respondents. In addition, at the end of the survey, a validation exercise was carried out by a faculty not involved in data collection. A random sample of the ten secondary sampling units (village and ward) was drawn and in each SSU a household was contacted by telephone to validate the data collected. The results indicated successful data collection with ignorable (<3%) missing or censored information.

This survey involved data collection from human subjects reviews was carried out and approved by the institutional Ethnical Review Committee of Aga Khan University vide letter number 2018-0615-836 on 24 November 2018.

2.3 Analysis

Demographic, socio-economic characteristics and health-seeking are reported in means and proportions. Survey sampling techniques are included in all the estimates. Age classifications of the World Health Organization were used to group the respondent by their age (WHO,2014). We classified SRI into five major categories and sixteen minor categories (Table 3).

The prevalence of illnesses was estimated as a proportion of respondents that reported an illness among all respondents of the survey. Confidence intervals of prevalence were obtained by normal approximation. Prevalence ratios were estimated to account for crucial exposure variables such as gender (except in gynecological disorders) age and least developed areas. We defined Gorabari and Keti Bandar as least developed Talukas as these were ranked lowest on socio-economic indicator among the four Talukas in Thatta District.

The prevalence ratios were estimated using Generalized Linear Models of the Poison family (Coutinho and Scazufca et al, 2008). Prevalence ratios are preferred over odd ratios to overcome the problem of overestimation and difficulties in convergence of the model (Coutinho and Scazufca et al, 2008. To analyze factors influencing the multiple SRIs (0-4) we estimated the coefficient for each covariate using a Zero-inflated Poisson Distribution by a Bayesian marginal likelihood function with Laplace- Metropolis approximation (Green, 2021). All analyses, data cleaning and imputation were carried out in STATA 15.1 while data is downloaded in Excel sheets.

3. Findings

The final sample is 1392 households (7811 individuals). Females were 48% of the sample. The adult population was 58% of the sample. Most of the adults were married (62%) and illiterate (75%). One-third (30%) of adults were employed at the time of the survey. Most of the population in Thatta district was rural (81%) except for Thatta Taluka where rural inhabitation was 67%. As opposed to the district average of literacy (23%) in Thatta taluka literacy was almost one-third of the population (30%). Among Talukas, the proportions of females and employed in Keti Bander, literate and living in urban areas in Thatta, married in Mirpure Sakro were higher than other talukas and the district average.

Nearly 37% of the respondents reported at least one SRI: 21% communicable diseases, 5% non-communicable diseases, 4% gastrointestinal and Liver diseases, 2% injuries and disabilities, and 2% other diseases, while 3% of the women of reproductive age reported pregnancy-related health care needs. Among all SRIs, Malaria/fever and flu/cough most common illnesses reported by the respondents (10 %) followed by upper respiratory tract infections.

The estimated prevalence ratios revealed that being a female (PR 1.2, CIs 1.13-1.27), aged over 60 years (PR 1.54, CIs 1.41-1.69) and under five years (PR 1.42, CIs 1.33-1.52) are more likely to report an SRI. Living in urban (PR 1.51, CIs 1.42-1.61) and from least developed areas (PR 1.37, CIs 1.29-1.45) were more likely to report an SRI (Figure 2). Generally being employed (PR 0.83, CIs 0.75-0.91) and living in large/extended families (PR 0.7, CIs 0.66-0.74) decreased the likelihood of falling ill in Thatta district. The prevalence ratios of Diabetes (PR 7.78, CIs 4.71-12.84) and Arthritis/musculoskeletal disorders (PR 4.91, CIs 2.55-9.47) in over 60 years were among the highest.

The factors that determine the multiple morbidities were similar as the factors determining being ill and types of diseases/disorders except for gender. Being a female decreases the

144 probability of multiple morbidities (mean -0.16, CIs -0.29- -0.04) in Thatta district. Living in
145 an urban increased the probability of multiple morbidities by 42% (CIs 0.3-0.51) followed by
146 living in the least developed areas (Regression Mean 0.29, CIs 0.15-0.41) whereas being
147 currently employees and living in an extended family decreased the probability of multiple
148 morbidities by 23% and 22% respectively.

149 **4. Discussions**

150 To the best of our knowledge, the most recent burden of disease survey prior to this study was
151 carried out in Pakistan in 1994 namely National Health Survey (PMRC,1994). This study
152 provides robust district-level representative estimates of the prevalence of SRI that are crucial
153 for evidence-based priority setting in district Thatta. The findings in this study depict an
154 alarming picture of health that contrasts with findings from national and provincial surveys
155 for the self-reported prevalence of illnesses. These findings advocate the importance of local
156 evidence for decentralized planning and management. However, there are certain limitations
157 to the interpretation of the results. Firstly, this survey was a rapid cross-sectional survey
158 conducted in spring and did not capture seasonal variation in the burden of disease. Secondly,
159 findings on the prevalence of disease are based on verbal autopsy: though with validation
160 techniques such as a record of formal consultation, enquiring for laboratory or radiographic
161 findings, etc., no clinical examination was conducted by the enumerators during the data
162 collection.

163 The small-scale rapid survey design used in this survey is similar to SRI surveys carried out
164 in 1-3 districts Giang and Allebeck (2003), Ir and Men (2010), Rehman and Gilmour et al,
165 2013 and Paudel (2020). Using separate recalls for data collection, “ever diagnosed” for non-
166 communicable/ Chronic diseases and four weeks for communicable/acute diseases is unique
167 to this survey. As from our literature search, we find that the health surveys on SRIs used

common recall for all diseases NCDs and CDs (Giang and Allebeck 2003; Ir an Men, 2010; Rehman and Gilmour et al, 2013; and Paudel,2020) and acute/ communicable disease survey by SeoAung and MyintOo et al (2015) used a 90 days recall. Disease surveys that focused on NCDs enquired about diseases based on "ever diagnosed/ informed by a physician or health worker" (Van Minh and Ng et al, 2008; Letamo and Keetile et al, 2017; Camacho and Gomez-Arbelaez et al, 2020; Van Minh and Long et al, 2020; Siddharthan and Kalyesubula et al, 2021).With the exception of Rehman and Gilmour et al, (2013), SRIs surveys that included all diseases were carried out in rural areas (Giang and Allebeck 2003; Ir an Men, 2010; and Paudel,2020). Surveys on NCD, on the other hand, were carried out in urban areas SeoAung and MyintOo et al (2015) or were on large-scale (Van Minh and Ng et al, 2008; Letamo and Keetile et al, 2017; Camacho and Gomez-Arbelaez et al, 2020).

A common feature of SRI surveys that we included in our literature review is that these were carried out in Low-and Low-middle income countries, Colombia (Camacho and Gomez-Arbelaez et al, 2020), Vietnam (Giang and Allebeck 2003; Van Minh and Long et al, 2020), Botswana (Letamo and Keetile et al, 2017), Nepal (Paudel,2020), Bangladesh (Rehman and Gilmour et al, 2013), Myanmar (SeoAung and MyintOo et al, 2015), Uganda (SeoAung and MyintOo et al (2015). A possible explanation for this trend is that the burden of disease data is not routinely collected in many LMICs. Moreover, the health surveys are expensive and in LMICs, such surveys are funded by the development partners restricting data collection to infectious diseases and maternal and child health such as Living Standard Surveys sponsored by the World Bank, Multi-Indicator Cluster Surveys by UNICEF, and Demographic and Health Surveys by the USAID.

Estimates of the lone Burden of Disease study by the Pakistan Medical Research Council, in 1994 for NCDs (37.7%) and CD (38.4%) (PMRC, 1994) were comparable, whereas in our case prevalence of CDs (20.67%) was higher than the prevalence of all NCDs (6.68%,)

193 including NCDs (4.77%) and injuries and disabilities (1.91%) in Thatta. These findings could
194 partly be due to the disease classification used in our study and partly due to the fact Thatta is
195 the least developed district in Pakistan while the Burden of Disease study was drawn from a
196 nationally representative sample. In a few cases, the findings in this paper are different from
197 the findings of national and provincial surveys with district representative sampling strategy,
198 for example, Pakistan Social and Living Standard Measurement Survey 2019-20 and Sindh
199 Multiple Indicator Cluster Survey 2018-19 (1). Our estimates of SRI (36.6%) are higher than
200 the Unknown SRI in Thatta district in PSLM 2019-20 (11.12%) and MICS 2018-19
201 (11.02%). Disability prevalence (0.7%) in our study is lower than PSLM 2019-20 (3.01%).

202 We could not synthesize the variation in the prevalence of SRIs in our study nor from the
203 literature that we could review. This was due to multiple aspects such as survey settings,
204 design of surveys, the recall period, timing, and period of data collection etc. For example,
205 estimates of SRI in this paper (36.6%) are lower the estimates of SRI by of Rehman and
206 Gilmour (2013) in a urban township in Bangladesh (45%, n= 1593 households), and findings
207 of in a rural district in Vietnam (47.7%, n=48919), but higher than Ir and Men (2010) in
208 three rural districts in Cambodia (15.05%, n=33161) and Paudel (2020) in a rural district in
209 Nepal (24.5%, n=6580). These studies used a rapid data collection spread over 3-4 months
210 and focused on all ages. However, the recall period in the case of Giang and Allebeck (2003),
211 Rehman and Gilmour (2013) and Paudel (2020) was last four weeks, while in the case of Ir
212 and Men (2010) the recall period was last one year in Colombia. Moreover, in the case of Ir
213 and Men (20010) the SRI data was collected by trained data collectors and was verified by a
214 public health doctor while in the case of Giang and Allebeck (2003), Rehman and Gilmour
215 (2013) such steps of enhancing quliaty of data collection were missing. Such variation in
216 survey design largely influences the prevalence of a disease. For example, diabetes
217 prevalence was found to be as low as 1.1% in Uganda as high as 5.7% in Colombia, and 9.3%

(metabolic diseases) in India. While in Colombia and India, the sample size was large: 11 districts and country level, in Uganda, the study was carried out in an urban district. The period of data collection spanned over one year in Colombia and India. In Uganda and Colombia, the sample was drawn from the adult population and in India the sample was unrestricted for age.

Our findings that women are more likely to report an illness(es) and multiple morbidities are consistent with literature reporting either proportions (Camacho and Gomez-Arbelaez et al, 2020; Giang and Allebeck 2003; Ir and Men et al 2010; Paudel, 2020; SoeAung and MyintOo et al 2015; or odd ratios (Letamo and Keetile et al 2017; Patras and Bhaise 2017; Rehman and Gilmour et al 2013; Siddharthan and Kalyesubula et al 2021; Van Minh and Ng et al, 2008) except Van Minh and Long et al, (2020) that reported odds of women (OR 0.98, CIs 0.81–1.18) reporting NCDs were lower than men in the minorities in Vietnam (Van Minh and Long et al, 2020).

Our findings suggest that respondents aged 60+ years are more likely to report SRIs or NCDs are consistent with literature findings that getting older increases prevalence or odds of NCDs (Camacho and Gomez-Arbelaez et al, 2020; SoeAung and MyintOo et al 2015, Letamo and Keetile et al 2017; Rehman and Gilmour et al 2013; Van Minh and Ng et al, 2008; VanMinh and Long et al 2020).

Our findings that living in urban areas increases the prevalence of SRIs than living in rural areas are consistent with Camacho and Gomez-Arbelaez et al (2020); Letamo and Keetile et al (2017); Patras and Bhaise (2017), particularly findings of Letamo and Keetile et al (2017) findings that in urban villages the prevalence of hypertension and Asthma was higher in urban villages than in rural areas and in cities, since the urban areas in Thatta are similar to peri-urban rather than proper urban areas with basic civic amenities. On employment status

our findings are similar to VanMinh and Long et al (2020) that report higher odds of NCDs for unemployed than employed (OR 1.59, CIs 0.96–2.69) whereas on household size our findings are supported by Rehman and Gilmour et al (2013) ORs of family size 0.89 (0.82–0.87) and Paudel, (2020) reporting of decreasing proportion with larger families (<4 members 26.8, 5-8 members 26.0% and 9+ members 20.2%).

5. Recommendations and Conclusion

For multiple reasons, our estimates of disease burden are more recent and policy relevant than the current evidence on disease profiling in Thatta district. A health survey capturing a complete disease profile is better than the disease specific surveys that are common in Pakistan. A fresh national level health survey will not only provide complete disease profiling but can unearth the relative weightage of diseases crucial for priority settings in the health sector at national and sub-national levels.

We argued that district representative data can aid better priority settings within the district. Recently, the Government of Sindh has constituted Provincial Finance Commission Award that will distribute resources among districts in Sindh. The findings of this survey provide a case study to allocate resources to districts and within district using the findings of this survey.

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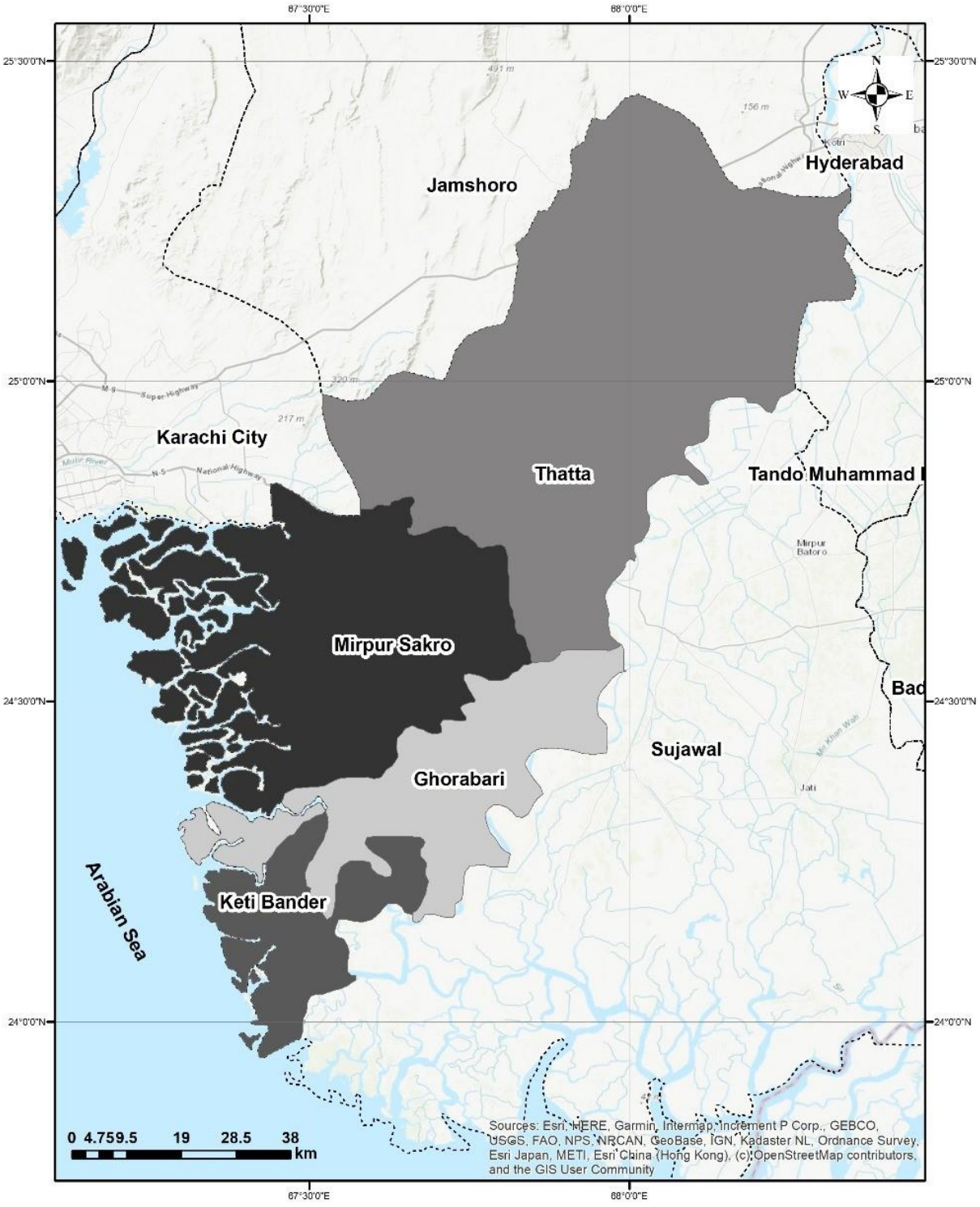
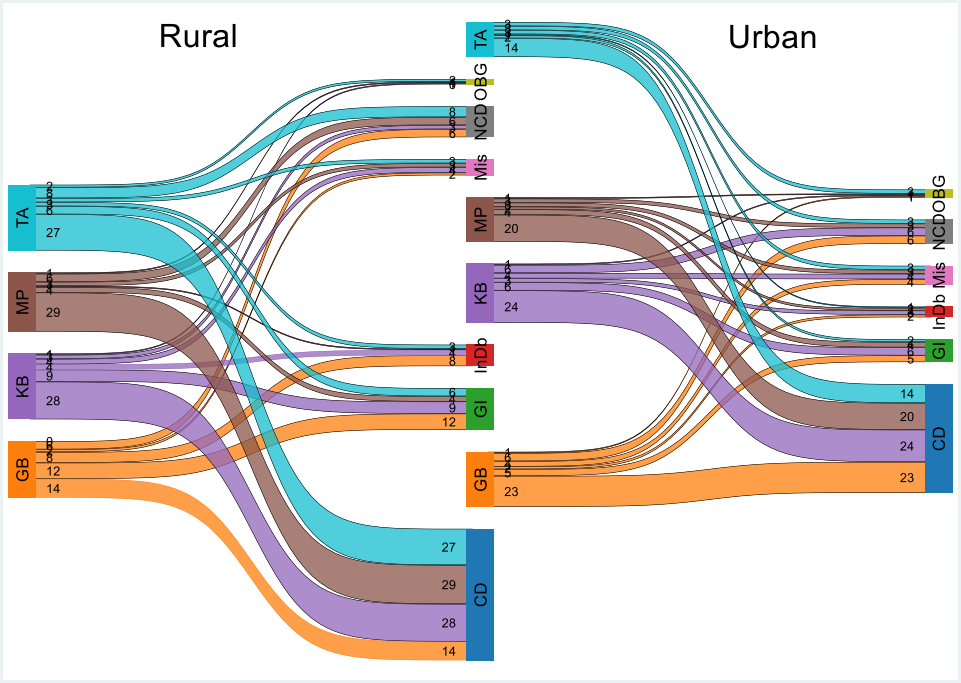


Figure 1 District and sub-districts/Talukas boundaries of Thatta

Figure 2 Rural and urban prevalence of self-reported illnesses in sub-districts of Thatta



Subdistricts GB: Ghorabari, KB: Keti Bunder, MP: Mirpur Sakro, TA: Thatta
CD: Communicable Disease, NCD: Non Communicable Diseases Mental Health Disorders, GI: Gastrointestinal & Liver Disorders
InDb:Injuries & Disabilities, OBG: Gynaecology & obstetrics, Mis: Other disorders