

# WHODAS disability assessment pilot in four regions of Italy

Evaluation report (Output 7.3 mid-pilot )



*Ufficio per le politiche in favore  
delle persone con disabilità*



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OECD Directorate for Employment, Labour and Social Affairs &  
OECD Trento Centre for Local Development

# WHODAS disability assessment pilot in four regions of Italy: An interim evaluation

Evaluation report (Output 7.3)  
Interim Mid-Pilot Version

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This report describes and discusses the interim results from a pilot of a new disability assessment tool, the WHO disability assessment schedule (WHODAS), in four regions of Italy. The full pilot will cover a sample of up to 5000 people (up to 2000 each in Lombardy and Campania and up to 500 each in Trentino and Sardinia). This interim analysis is based on a sub-sample of 1474 cases (950 from Campania, 351 from Lombardy, and 173 from Sardinia). Using mathematical-statistical modelling, the report assesses the performance of the WHODAS questionnaire and concludes that the tool is working well in Italy and delivering plausible, coherent, and scientifically sound distributions of WHODAS scores in all pilot regions. The report also compares the WHODAS scores of the mid-pilot sample with the corresponding ratings for civil invalidity. Recommendations on how the WHODAS questionnaire could be used for disability assessment in Italy or integrated into the current way of assessing civil invalidity, will be found in the final pilot evaluation.

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# 1. Introduction

Disability assessment in Italy is fragmented, discretionary and outdated. The assessment of civil invalidity which determines a person's rights and entitlements to benefits and supports is limited to the identification of a medical condition, thereby ignoring the considerable conceptual developments in our understanding of disability during the past three decades. Disability is now considered a social construct that is determined by a person's social, economic, and physical environment. This is reflected in the International Classification of Functioning, Disability and Health (ICF) framework, which was approved in 2001 by all WHO member states, including Italy. Ever since, the Italian government has strived to reform its system, also in order to comply with the UN Convention on the Rights of Persons with Disabilities which the country has ratified in 2009 – but with limited success. Meanwhile, pressure for reform is building up from all sides, internationally and nationally, as all stakeholders agree that reform is urgently needed.

This report summarises the results of an ongoing pilot in four regions of Italy which is testing the feasibility of the inclusion of functioning information into the current assessment of invalidity. This is done by piloting the use of the WHO Disability Assessment Schedule (WHODAS) which was developed as a tool to identify the kind and nature of problems people are facing, aligned with the ICF framework. The pilot is also unique insofar as the WHODAS questionnaire is implemented by social workers, not doctors. A great advantage of the WHODAS tool is that it has been tested successfully in many countries and contexts; hence, Italy can draw not only on the experiences with its ongoing pilot but also on experiences in other countries.

The report summarises the mid-pilot findings, based on a sub-sample of 1474 cases from three regions, to support the ongoing reform process while and as it happens. The full evaluation, which will include a sample up to 5000 cases from four regions, will be prepared as soon as the full pilot data become available; the plan being to have a draft of the full evaluation available by end of June. The mid-pilot evaluation is a way to test the quality of the pilot implementation. The sub-sample is large enough to draw meaningful inferences on the expected results and the usefulness of the inclusion of a functioning tool into the assessment of civil invalidity. The full evaluation will go a step further in discussing options and making recommendations on how functioning information, collected through the WHODAS questionnaire, can be used for, or merged into, the current assessment process and how doctors (the main actors in civil invalidity assessment today) can best be supported by social workers (as implementors of the functioning tool).

This pilot is part of a larger project, conducted by the OECD together with the Italian government and funded by the European Union, on the reform of disability assessment and social protection for people with disability in Italy. The project aims to help the government in identifying and overcoming the key challenges the country is facing, with the ultimate goal to support people with disability more effectively and more efficiently, and more uniformly across the country.

## 2. Sample & WHODAS distribution

In the ICF framework, information about categories of Activities and Participation can be collected either from the perspective of capacity (reflecting exclusively the expected ability of a person to perform activities considering their health conditions and impairments) or the perspective of performance (reflecting the actual performance of activities in the real-world environmental circumstances in which the person lives). Information about capacity typically represents the results of a clinical inference or judgment based on medical information, while performance is a true description of what occurs in a person's life. The two perspectives are therefore very different, although capacity constitutes a determinant of performance.

As the administrative act of establishing eligibility for services and supports, disability is assessed as the overall lived experience of an individual living with one or more health problems – or in ICF terms, it is the level of a person's performance in light of their intrinsic health capacity and environmental facilitators or barriers. Disability assessment is a 'whole person', or global, assessment of the extent or level of a person's disability. This is important because a disability assessment should be a summary measure of functioning levels across domains of actions, simple and complex, from walking, taking care of children to working at a job. A disability assessment is an assessment of the overall level of disability that a person experiences in his or her life. A global assessment of disability must be based both on the individual's health state and specific assessments of specific activities. Yet a summary assessment of disability is valid only if the specific assessments can be statistically summarized into a single assessment score. A disability assessment is a summary measure of the level of a person's performance of an adequately representative set of behaviours and actions, simple to complex, in their actual environment, considering the person's state of health.

The ICF understands 'disability' to be any level of problem or difficulty in functioning in some domain, from the perspective of performance. The WHO developed, tested, and has consistently recommended the WHODAS as a questionnaire that can capture the performance of activities by an individual in his or her daily lives and actual living environment. The 'actual environment' is represented in the ICF in terms of environmental factors that act either as facilitators (e.g., assistive devices, supports, home modifications) or as barriers (inaccessible houses, streets and public buildings, stigma, and discrimination). The WHODAS questionnaire, in short, is WHO's recommended, generic, performance-based disability assessment tool. It is structured around six basic functioning domains:

- D1: Cognition – understanding & communicating
- D2: Mobility – moving & getting around
- D3: Self-care – hygiene, dressing, eating & staying alone
- D4: Getting along – interacting with other people
- D5: Life activities – domestic responsibilities, leisure, work & school
- D6: Participation – joining in community activities

The clinical version of the WHODAS questionnaire collects information about functioning and problems in functioning – i.e., disability – by means of an interview conducted by a trained interviewer who asks a set of standardized questions – and, if necessary, follow-up probe questions. WHODAS uses a 5-level response scale (1 = None, 2 = Mild, 3 = Moderate, 4 = Severe, 5 = Extreme or Cannot do) to rate each question. It should be clear that the WHODAS is not a self-report questionnaire; it is rather a questionnaire administered in a face-to-face or telephone interview by a trained professional. Respondents are informed that their answers about each domain of functioning should adopt the perspective of performance – that is, they should describe what they actually do, taking into account their actual experience in their daily life and specifically in light of all environmental barriers and facilitators that they experience. The WHODAS 36-item, clinically administered version was chosen to collect information about a substantial range of functioning



domains to create a full picture of the disability experienced by the respondent in their everyday life. The 36 WHODAS items are summarised in Table 1 by functioning domain.

**Table 1: WHODAS items for the 36-item long form**

In the past 30 days, how much difficulty did you have in:	
<b>Understanding and communicating</b>	
D1.1	Concentrating on doing something for ten minutes?
D1.2	Remembering to do important things?
D1.3	Analysing and finding solutions to problems in day-to-day life?
D1.4	Learning a new task, for example, learning how to get to a new place?
D1.5	Generally understanding what people say?
D1.6	Starting and maintaining a conversation?
<b>Getting around</b>	
D2.1	Standing for long periods such as 30 minutes?
D2.2	Standing up from sitting down?
D2.3	Moving around inside your home?
D2.4	Getting out of your home?
D2.5	Walking a long distance such as a kilometer [or equivalent]?
<b>Self-care</b>	
D3.1	Washing your whole body?
D3.2	Getting dressed?
D3.3	Eating?
D3.4	Staying by yourself for a few days?
<b>Getting along with people</b>	
D4.1	Dealing with people you do not know?
D4.2	Maintaining a friendship?
D4.3	Getting along with people who are close to you?
D4.4	Making new friends?
D4.5	Sexual activities?
<b>Life activities</b>	
D5.1	Taking care of your household responsibilities?
D5.2	Doing most important household tasks well?
D5.3	Getting all the household work done that you needed to do?
D5.4	Getting your household work done as quickly as needed?
D5.5	Your day-to-day work/school?
D5.6	Doing your most important work/school tasks well?
D5.7	Getting all the work done that you need to do?
D5.8	Getting your work done as quickly as needed?
<b>Participation in society:</b>	
D6.1	How much of a problem did you have in joining in community activities in the same way as anyone else can?
D6.2	How much of a problem did you have cause of barriers or hindrances in the world around you?
D6.3	How much of a problem did you have living with dignity cause of attitudes and actions of others?
D6.4	How much time did you spend on your health condition or its consequences?
D6.5	How much have you been emotionally affected by your health condition?
D6.6	How much has your health been a drain on the financial resources of you or your family?
D6.7	How much of a problem did your family have because of your health problems?
D6.8	How much of a problem did you have in doing things by yourself for relaxation or pleasure?

## 2.1. Sample characteristics

The descriptive statistics of the population participating in the survey and covered in this interim evaluation are shown in Table 2. Participants that were included were all between 18 and 68 years old, i.e., of working age, and capable of understanding and responding to the questions asked by the interviewer. Information was collected from N = 1474 individuals. The proportion of male participants was lower (45.8% vs. 54.2%, respectively). The average age was 51.7 years (SD = 11.5). Most participants indicated their marital status as being married (57.2%), 24.4% indicated never having been married. Most respondents were living independently in the community (96.8%). Many participants indicated either having paid work (33.6%) or being unemployed either for health (17.8%) or other (23.7%) reasons.

**Table 2: Pilot sample – descriptive statistics**

<b>N</b>	1474
<b>Gender = Male (%)</b>	675 (45.8)
<b>Age – mean (SD)</b>	51.73 (11.49)
<b>Years of Education – mean (SD)</b>	11.25 (3.63)
<b>Marital status (%)</b>	
Never married	359 (24.4)
Currently married	842 (57.2)
Separated	85 (5.8)
Divorced	87 (5.9)
Widowed	55 (3.7)
Cohabiting	45 (3.1)
<b>Living condition (%)</b>	
Independent in the community	1427 (96.8)
Assisted living	47 (3.2)
Hospitalized	0 (0.0)
<b>Work status (%)</b>	
Paid work	495 (33.6)
Self-employed	78 (5.3)
Non-paid work	1 (0.1)
Student	42 (2.9)
Keeping house	140 (9.5)
Retired	98 (6.7)
Unemployed (health reasons)	262 (17.8)
Unemployed (other reasons)	349 (23.7)
Other	7 (0.5)

The sample socio-demographic information by region is presented in Table 3. For this mid-pilot evaluation, data was available for three Italian regions, Campania, Sardinia, and Lombardy, with the majority of the data coming from Campania. The proportion of male participants was higher in Lombardy than in the other regions (49.6%). The average ages were 52.4 years (SD = 10.8) in Campania, 50.4 years (SD = 12.2) in Sardinia, and 50.2 years (SD = 12.11) in Lombardy. Across all regions, most participants indicated their marital status as being married (63% in Campania, 48.4% in Lombardy, 42.8% in Sardinia) and most respondents were living independently in the community (> 95%). The data on employment was collected in different manners so that for some of the data collected in Campania detailed information is missing, i.e., it is not possible to know if unemployment was health-related or not or if the work activity was for an employer or self-employed. In general, many participants indicated either having paid work or being unemployed. At over 50%, the share in paid work was especially high in Lombardy.

Table 4 presents the frequency and percentages of observed ICD-11 diagnostic chapters. Data collected in Italy is unspecific with regards to the ICD-codes entered, i.e., indication if an ICD-code is a main condition or a comorbidity is missing. Therefore, all reported ICD-chapter codes were included in the following descriptive analyses, regardless of the degree to which participants were affected by the conditions. Four health conditions seem to dominate in Italy: diseases of the musculoskeletal system and connective tissue (N = 319, 19.56%); neoplasms (N = 283; 17.35%); diseases of the circulatory system (N = 262, 16.06%); and mental and behavioural disorders (N = 257; 15.76%).



Table 3: Pilot sample – descriptive statistics by participating region in Italy

	Campania	Lombardy	Sardinia
<b>N</b>	950	351	173
<b>Gender = Male (%)</b>	420 (44.3)	174 (49.6)	81 (46.8)
<b>Age – mean (SD)</b>	52.42 (10.85)	50.22 (12.11)	51.02 (13.16)
<b>Years of Education – mean (SD)</b>	11.36 (3.73)	10.95 (3.19)	11.25 (3.88)
<b>Marital Status (%)</b>			
Never married	198 (20.9)	101 (28.8)	60 (34.7)
Currently married	598 (63.0)	170 (48.4)	74 (42.8)
Separated	51 (5.4)	19 (5.4)	15 (8.7)
Divorced	46 (4.8)	30 (8.5)	11 (6.4)
Widowed	38 (4.0)	11 (3.1)	6 (3.5)
Cohabiting	18 (1.9)	20 (5.7)	7 (4.0)
<b>Living Condition (%)</b>			
Independent in the community	911 (95.9)	343 (97.7)	173 (100.0)
Assisted living	39 (4.1)	8 (2.3)	0 (0.0)
Hospitalized	0 (0.0)	0 (0.0)	0 (0.0)
<b>Work Status (%)</b>			
Paid work	266 (28.1)	183 (52.1)	46 (26.6)
Self-employed	61 (6.4)	11 (3.1)	6 (3.5)
Non-paid work	1 (0.1)	0 (0.0)	0 (0.0)
Student	19 (2.0)	13 (3.7)	10 (5.8)
Keeping house	96 (10.1)	27 (7.7)	17 (9.8)
Retired	60 (6.3)	23 (6.6)	15 (8.7)
Unemployed (health reasons)	141 (14.9)	63 (17.9)	58 (33.5)
Unemployed (other reasons)	300 (31.6)	29 (8.3)	20 (11.6)
Other	4 (0.4)	2 (0.6)	1 (0.6)

Table 4 Prevalence of Health conditions in the study population by ICD-11 Health Condition Chapter

ICD-Chapter	N	%
1 Certain infectious or parasitic diseases	4	0.25 %
2 Neoplasms	283	17.35 %
3 Diseases of the blood or blood-forming organs	4	0.25 %
4 Diseases of the immune system	15	0.92 %
5 Endocrine, nutritional or metabolic diseases	85	5.21 %
6 Mental, behavioural or neurodevelopmental disorders	257	15.76 %
8 Diseases of the nervous system	90	5.52 %
9 Diseases of the visual system	31	1.9 %
10 Diseases of the ear or mastoid process	44	2.7 %
11 Diseases of the circulatory system	262	16.06 %
12 Diseases of the respiratory system	54	3.31 %
13 Diseases of the digestive system	67	4.11 %
14 Diseases of the skin	2	0.12 %
15 Diseases of the musculoskeletal system and diseases of connective tissue	319	19.56 %
16 Diseases of the genitourinary system	24	1.47 %
20 Developmental anomalies	3	0.18 %
21 Symptoms, signs or clinical findings, not elsewhere classified	24	1.47 %
22 Injury, poisoning or certain other consequences of external causes	10	0.61 %
24 Factors influencing health status or contact with health services	53	3.25 %
<b>Total</b>	<b>1631</b>	<b>100%</b>

Note: The total is larger than the sample because of people reporting more than one health condition.

Disaggregated by region, the frequency and percentages show that the prevalence of reported conditions across regions varied considerably (Table 5). While neoplasms had the highest prevalence in Campania (23%), diseases of the musculoskeletal system and diseases of connective tissue were most prevalent in Sardinia (20.1%) and Lombardy (26.1%). Mental, behavioural or neurodevelopmental disorders were reported by 19% in Campania, 12.2% in Sardinia, and 8.7% in Lombardy. Lombardy also reported 10% of endocrine, nutritional, or metabolic diseases.

**Table 5 Prevalence of diagnoses as ICD-11 chapter, for the participating regions in Italy**

ICD-Chapter	Campania		Sardinia		Lombardy	
	N	%	N	%	N	%
1 Certain infectious or parasitic diseases	1	0.1%	0	0%	3	1.3%
2 Neoplasms	223	23.04%	45	10.39%	15	6.52%
3 Diseases of the blood or blood-forming organs	2	0.21%	0	0%	2	0.87%
4 Diseases of the immune system	4	0.41%	10	2.31%	1	0.43%
5 Endocrine, nutritional or metabolic diseases	55	5.68%	7	1.62%	23	10%
6 Mental, behavioural or neurodevelopmental disorders	184	19.01%	53	12.24%	20	8.7%
8 Diseases of the nervous system	35	3.62%	37	8.55%	18	7.83%
9 Diseases of the visual system	14	1.45%	13	3%	4	1.74%
10 Diseases of the ear or mastoid process	24	2.48%	17	3.93%	3	1.3%
11 Diseases of the circulatory system	167	17.25%	58	13.39%	37	16.09%
12 Diseases of the respiratory system	18	1.86%	33	7.62%	3	1.3%
13 Diseases of the digestive system	26	2.69%	28	6.47%	13	5.65%
14 Diseases of the skin	0	0%	0	0%	2	0.87%
15 Diseases of the musculoskeletal system and diseases of connective tissue	172	17.77%	87	20.09%	60	26.09%
16 Diseases of the genitourinary system	11	1.14%	5	1.15%	8	3.48%
20 Developmental anomalies	1	0.1%	1	0.23%	1	0.43%
21 Symptoms, signs or clinical findings, not elsewhere classified	10	1.03%	9	2.08%	5	2.17%
22 Injury, poisoning or certain other consequences of external causes	3	0.31%	1	0.23%	6	2.61%
24 Factors influencing health status or contact with health services	18	1.86%	29	6.7%	6	2.61%
<b>Total</b>	<b>968</b>	<b>100%</b>	<b>433</b>	<b>100%</b>	<b>230</b>	<b>100%</b>

## 2.2. WHODAS frequencies

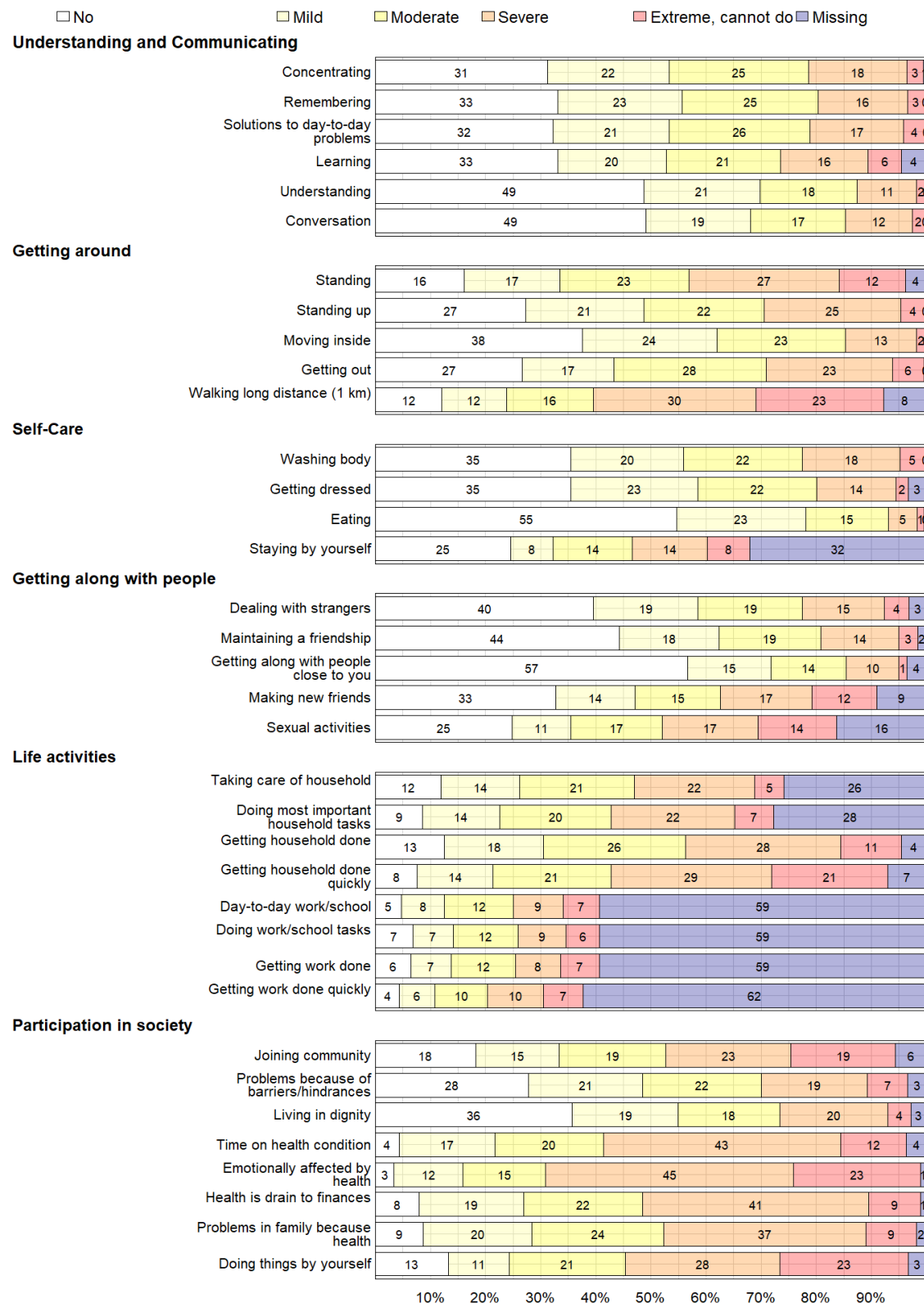
Table 6 shows the descriptive statistics for the 36 WHODAS items, including the number and percentage of missing values. More than half of the participants indicated their problems to be severe or extreme for the following items: D6.5 - How much have you been emotionally affected by your health condition? (68.5%), D6.4 - How much time did you spend on your health condition or its consequences? (54.95%), D2.5 - Walking a long distance, such as a kilometer [or equivalent]? (52.71%), D6.8 - How much of a problem did you have in doing things by yourself for relaxation or pleasure? (51.36%), D6.6 - How much has your health been a drain on the financial resources of you or your family? (50.47%), and D5.4 - Getting your household work done as quickly as needed? (50.2%). The descriptive statistics for the ratings of the WHODAS disaggregated by the three regions of Italy are reported in the Annex.

Table 6: Frequencies and percentages of WHODAS responses

Item	No	Mild	Moderate	Severe	Extreme,	Missing
D1.1	461 (31.28%)	324 (21.98%)	373 (25.31%)	263 (17.84%)	45 (3.05%)	8 (0.54%)
D1.2	487 (33.04%)	334 (22.66%)	364 (24.69%)	238 (16.15%)	47 (3.19%)	4 (0.27%)
D1.3	476 (32.29%)	310 (21.03%)	377 (25.58%)	250 (16.96%)	58 (3.93%)	3 (0.2%)
D1.4	487 (33.04%)	292 (19.81%)	304 (20.62%)	235 (15.94%)	90 (6.11%)	66 (4.48%)
D1.5	718 (48.71%)	311 (21.1%)	260 (17.64%)	159 (10.79%)	23 (1.56%)	3 (0.2%)
D1.6	723 (49.05%)	280 (19%)	255 (17.3%)	178 (12.08%)	33 (2.24%)	5 (0.34%)
D2.1	237 (16.08%)	256 (17.37%)	346 (23.47%)	402 (27.27%)	177 (12.01%)	56 (3.8%)
D2.2	402 (27.27%)	316 (21.44%)	321 (21.78%)	367 (24.9%)	64 (4.34%)	4 (0.27%)
D2.3	553 (37.52%)	360 (24.42%)	344 (23.34%)	191 (12.96%)	23 (1.56%)	3 (0.2%)
D2.4	393 (26.66%)	244 (16.55%)	409 (27.75%)	338 (22.93%)	83 (5.63%)	7 (0.47%)
D2.5	177 (12.01%)	173 (11.74%)	232 (15.74%)	435 (29.51%)	342 (23.2%)	115 (7.8%)
D3.1	523 (35.48%)	301 (20.42%)	319 (21.64%)	260 (17.64%)	67 (4.55%)	4 (0.27%)
D3.2	522 (35.41%)	341 (23.13%)	317 (21.51%)	212 (14.38%)	34 (2.31%)	48 (3.26%)
D3.3	806 (54.68%)	345 (23.41%)	221 (14.99%)	77 (5.22%)	18 (1.22%)	7 (0.47%)
D3.4	362 (24.56%)	114 (7.73%)	211 (14.31%)	201 (13.64%)	113 (7.67%)	473 (32.09%)
D4.1	583 (39.55%)	280 (19%)	280 (19%)	219 (14.86%)	66 (4.48%)	46 (3.12%)
D4.2	652 (44.23%)	267 (18.11%)	273 (18.52%)	208 (14.11%)	51 (3.46%)	23 (1.56%)
D4.3	835 (56.65%)	223 (15.13%)	201 (13.64%)	141 (9.57%)	22 (1.49%)	52 (3.53%)
D4.4	482 (32.7%)	213 (14.45%)	228 (15.47%)	245 (16.62%)	173 (11.74%)	133 (9.02%)
D4.5	366 (24.83%)	157 (10.65%)	244 (16.55%)	256 (17.37%)	211 (14.31%)	240 (16.28%)
D5.1	175 (11.87%)	211 (14.31%)	307 (20.83%)	322 (21.85%)	78 (5.29%)	381 (25.85%)
D5.2	126 (8.55%)	206 (13.98%)	299 (20.28%)	330 (22.39%)	104 (7.06%)	409 (27.75%)
D5.3	185 (12.55%)	265 (17.98%)	380 (25.78%)	415 (28.15%)	163 (11.06%)	66 (4.48%)
D5.4	112 (7.6%)	202 (13.7%)	316 (21.44%)	430 (29.17%)	310 (21.03%)	104 (7.06%)
D5.5	70 (4.75%)	115 (7.8%)	184 (12.48%)	133 (9.02%)	98 (6.65%)	874 (59.29%)
D5.6	100 (6.78%)	108 (7.33%)	173 (11.74%)	129 (8.75%)	90 (6.11%)	874 (59.29%)
D5.7	95 (6.45%)	107 (7.26%)	173 (11.74%)	120 (8.14%)	104 (7.06%)	875 (59.36%)
D5.8	64 (4.34%)	95 (6.45%)	141 (9.57%)	149 (10.11%)	107 (7.26%)	918 (62.28%)
D6.1	268 (18.18%)	224 (15.2%)	285 (19.34%)	334 (22.66%)	280 (19%)	83 (5.63%)
D6.2	410 (27.82%)	305 (20.69%)	317 (21.51%)	284 (19.27%)	108 (7.33%)	50 (3.39%)
D6.3	527 (35.75%)	283 (19.2%)	271 (18.39%)	289 (19.61%)	62 (4.21%)	42 (2.85%)
D6.4	63 (4.27%)	256 (17.37%)	291 (19.74%)	635 (43.08%)	175 (11.87%)	54 (3.66%)
D6.5	50 (3.39%)	184 (12.48%)	221 (14.99%)	664 (45.05%)	339 (23%)	16 (1.09%)
D6.6	116 (7.87%)	281 (19.06%)	318 (21.57%)	605 (41.04%)	139 (9.43%)	15 (1.02%)
D6.7	128 (8.68%)	291 (19.74%)	352 (23.88%)	542 (36.77%)	134 (9.09%)	27 (1.83%)
D6.8	195 (13.23%)	163 (11.06%)	310 (21.03%)	414 (28.09%)	343 (23.27%)	49 (3.32%)

Figure 1 visualizes how the items of the WHODAS have been rated. The percentage of missing values was highest for the items D5.5 to D5.8 that assess difficulties at work (or in school), as all participants were over 18 years old, with many being unemployed for health or other reasons. More than 20% of missing values were also found for D5.1 - Taking care of household responsibilities and D5.2 - Doing most important household tasks, as these two questions were not consistently assessed across all the countries at the start of the assessment pilot.

Figure 1: Percentage of ratings of degree of disability for each WHODAS item



### 2.3. WHODAS score distribution

Figure 2 shows the distribution of the total scores obtained when adding up the 36 items of WHODAS. The total WHODAS score does not include items D5.5 to D5.8 because of their large number of missing values. The total raw WHODAS score ranges from 32 to 160, a few total scores below 32 are possible, as the scores are computed on the raw data with missing values. The colored segments in Figure 2 indicate the position and value of the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> quartiles, with a median score of 79. The density lines in Figure 3 show the density of the observed scores (red line) and the corresponding normal distribution with the same mean and standard deviation (dotted line). The scores in this sample are distributed relatively normally.

Figure 2: Raw score distribution of the WHODAS

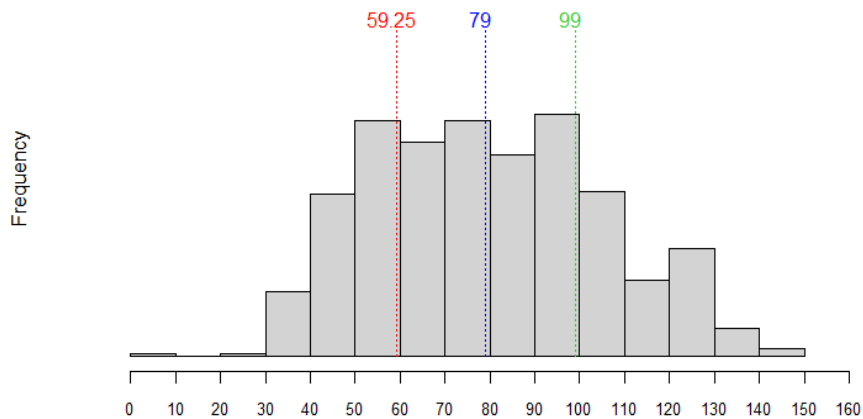
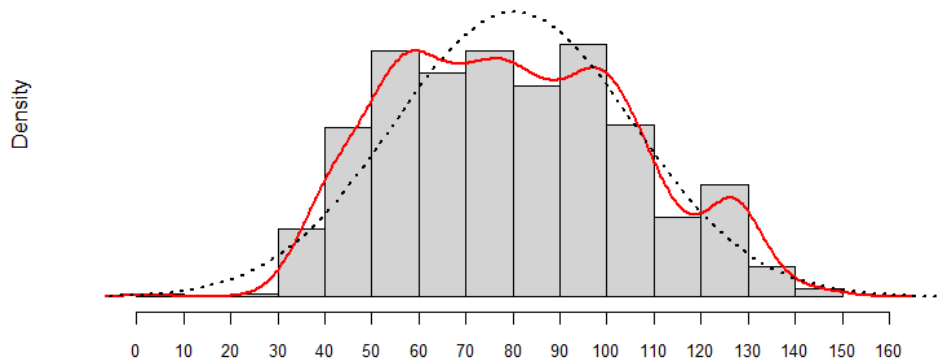
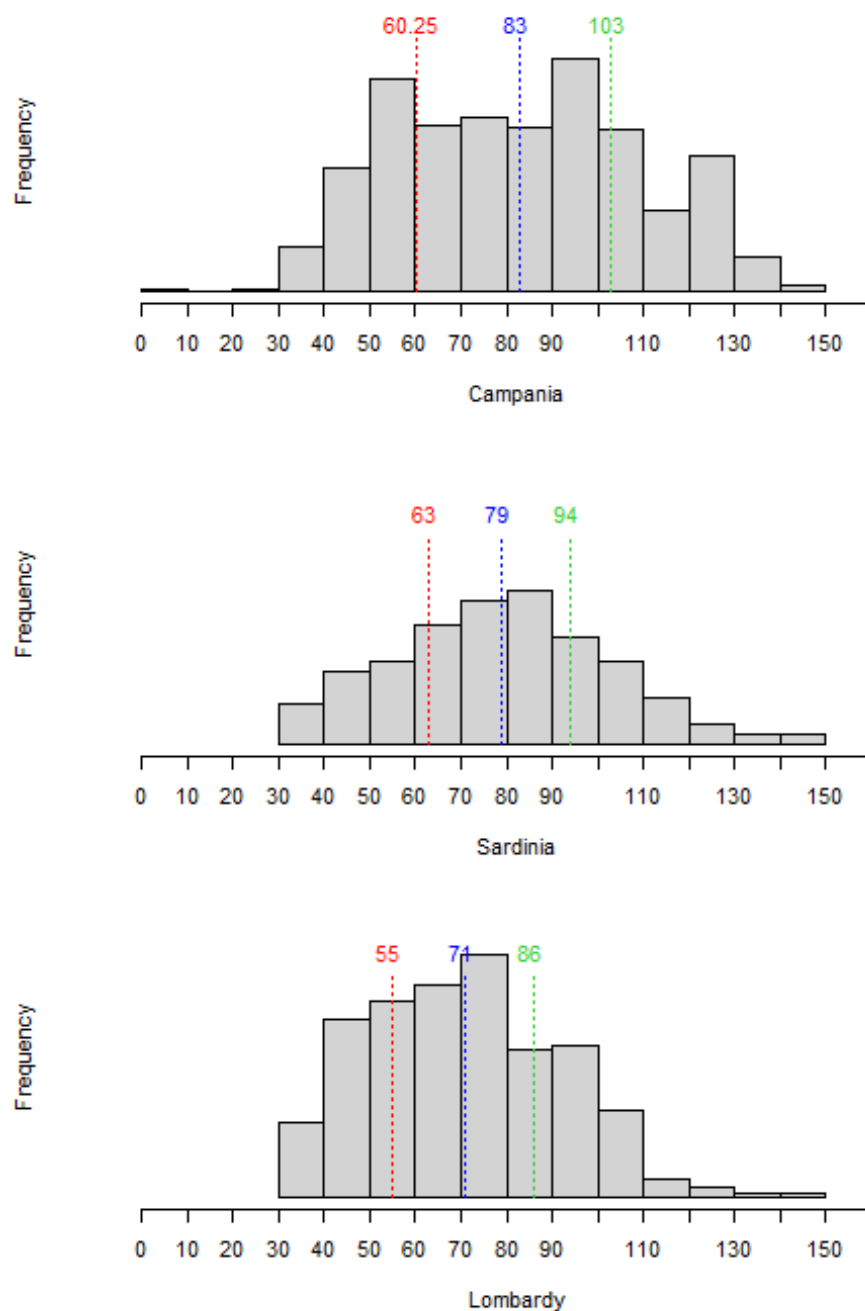


Figure 3: Score density: observed versus random normal



The score distributions of the WHODAS across regions (Figure 4) present small differences. The highest median WHODAS score is found for Campania (Q2 = 83) and the lowest in Lombardy (Q2 = 72). Higher WHODAS scores indicate higher levels of disability. Campania is also the only of the three regions in which the score distribution seems to deviate from the expected normal distribution, despite the fact that the sample for this mid-pilot evaluation is much larger for Campania than for Sardinia and Lombardy.

Figure 4: Raw score distributions of the WHODAS in the three regions





## 3. Psychometric analysis

Rasch analysis is a statistical method from the field of probabilistic measurement. It is a modern test theory approach first introduced in the 1960's by the Danish mathematician George Rasch (Rasch, 1960). The items of the WHODAS are rated by means of more than two response options and were so calibrated with the Partial Credit Model (Masters, 1982), an extension of the Rasch model developed for dichotomous data.

Rasch analysis is essentially testing several measurement assumptions (Bond and Fox, 2001; Tennant and Conaghan, 2007): (1) the targeting of the scale, (2) the model reliability, (3) the ordering of the items' response options, (4) the absence of correlation between items (Local Item Dependencies - LID), (5) the fit of the items to the Rasch model, (6) the absence of effects of person factors such as gender and age on item responses (Differential Item Functioning - DIF), and (7) the unidimensionality of the questionnaire. If these measurement assumptions can be met, a questionnaire can be considered psychometrically sound and derived total scores therefore be considered interval-scaled and operative for measurement.

For a well-performing questionnaire, it is expected that the difficulty of the items is matched to the level of ability of the measured population, i.e., the questionnaire should not be too easy or too difficult. Statistically, good targeting (*assumption #1*) is achieved if the mean item difficulty and mean person ability are approximating zero. A Person Separation Index (PSI) above 0.8 speaks for a good reliability of the scale and values above 0.9 for very good reliability (*assumption #2*). The PSI indicates how well the scale can discriminate levels of functioning in the population. The Cronbach  $\alpha$ , which is typically also reported, is a classical measure of the internal consistency of the data, i.e., how well the items work to describe one construct (Nunnally and Bernstein, 1994). In the presence of disordered response options (*assumption #3*), an analysis of response probability curves allows to determine which response options cause problems and decide on strategies to aggregate disordered response options. For example, if for an item the response options 2 and 1 appear reversed and indicate that an increase of difficulty cannot be discriminated, the item responses can be recoded so that these options represent only one level of response. LID often occurs when items are redundant and measure approximately the same aspect of a construct (*assumption #4*). The most widely reported statistic for the item dependencies is the Q3 matrix, i.e., the correlation matrix of the Rasch residuals (Yen, 1984). Residual correlations above 0.2 are considered as not acceptable and a way to address these local item dependencies, without deleting items, is to aggregate (i.e., to sum up) the correlating items into so-called testlets (Yen, 1993). In item testlets, the ordering of the thresholds is not expected anymore. For good item fit (*assumption #5*), the infit and outfit values are expected below 1.2 (Smith, Schumacker, and Bush, 1998). The outfit statistic is more sensitive to outlier as the infit statistic. Ideally, items of a questionnaire should show certain fairness and not favor sample subgroups. The analysis of DIF allows to flag exogenous variables, or DIF variables (*assumption #6*), which conduct to a lack of invariance of the item difficulty (Holland and Wainer, 1993). It is worthwhile to note that a DIF analysis is not always indicating a metric bias but can also simply represent subgroups with an unequal underlying ability (Boone, Staver and Yale, 2014). No DIF analysis has been undertaken for the midterm report, but based on past experiences with WHODAS, it can be expected that responses to many WHODAS items are affected by the age of respondents and, to a lesser degree, their gender. Finally, a questionnaire should measure only one construct. If a questionnaire shows to have several separate dimensions, the validity of one summary total score is not supported. Unidimensionality (*assumption #7*) was assessed with a principal component analysis of the Rasch residuals (Smith, 2002). Typically, a first eigenvalue lower than 1.8 is deemed indicative of unidimensionality. Based on simulation analyses, Smith and Miao (1994) suggested considering the size of the second component instead, with values below 1.4 indicative of unidimensionality. The above analyses were all performed with the software R (Team, 2016).

### 3.1. Metric properties of WHODAS

The pilot implemented the complete 36-item version of WHODAS. However, items D5.5 to D5.8, which were answered only by persons working or in education, presented about 60% of missing values. For this reason, the WHODAS-based functioning score is built with the remaining 32 items. The highest proportion of missing values is found for D3.4 - Staying by yourself for a few days (31.8%). The Items D5.1 - Taking care of your household responsibilities? (23.2%) and D5.2 - Doing most important household tasks well? (25.2%) also showed higher proportion of missing values because they were not collected in the first assessment wave in Lombardy. The remaining items contained about or less than 10% of missing values, see Table 6 above. Only items D5.5 to D5.8, on education and employment, were removed from the analysis. With a sample size of  $N = 1424$ , it is assumed that the Rasch model can handle about 20% of missing values in 2 of 32 items (Fellinghauer, Prodingner, and Tennant, 2018), nonetheless the person parameter scores were computed using an imputed dataset (Stekhoven and Buhmann, 2012), i.e., imputing values for the two items that had initially not been included in the Lombardy questionnaire.

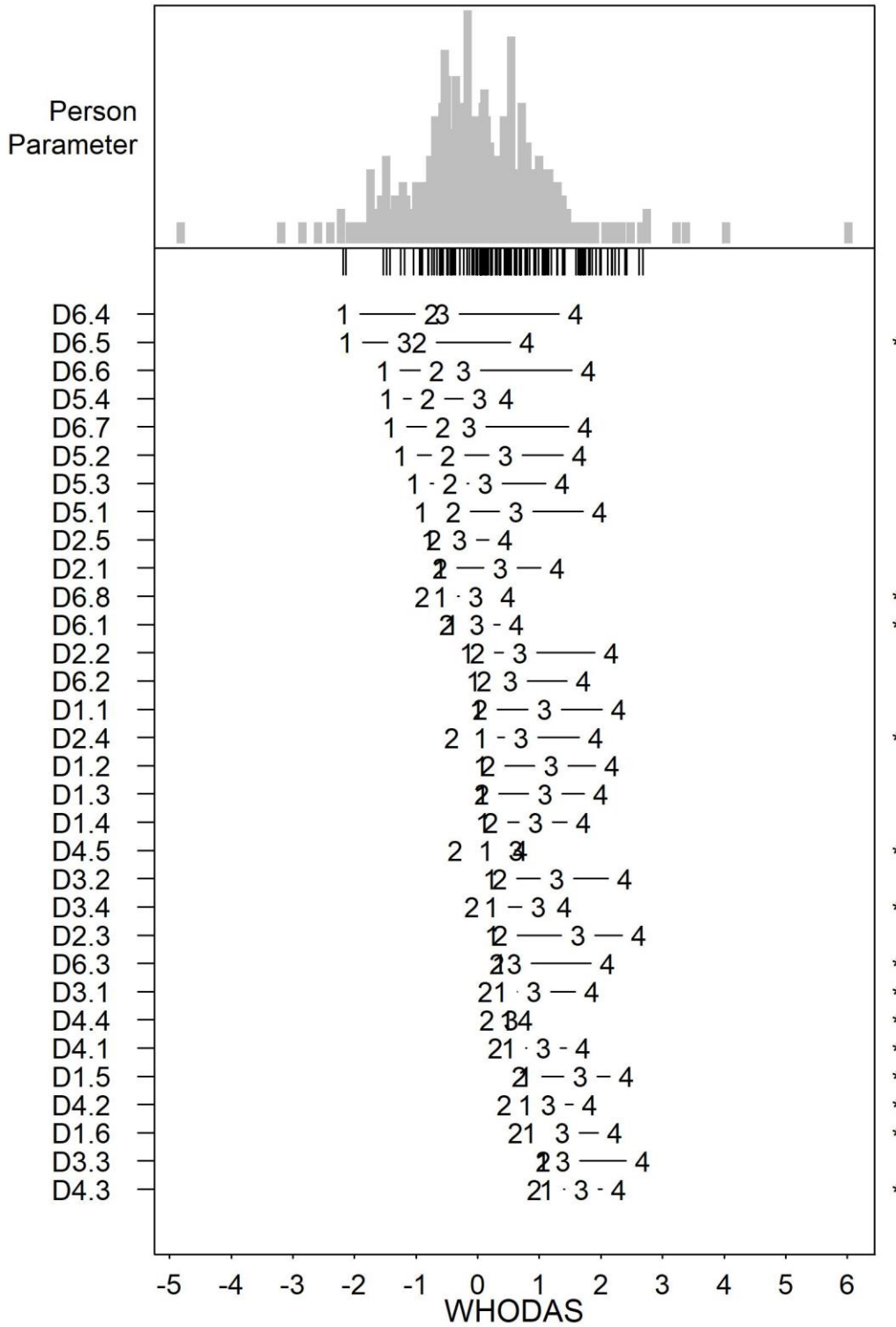
The Rasch analysis showed that the scale is multidimensional, with a strong tendency of the items to load (i.e., to correlate with other variables) within WHODAS domains. Only a few items loaded across domains and, similarly, only a few items were free of dependencies altogether. To solve the multidimensionality and local-item dependencies, correlating items were aggregated by accounting for the domain structure of the WHODAS questionnaire. The detailed resulting statistics are shown in Table 7 for the reliability and quality of targeting, Table 8 for the fit statistics at the start of the analysis, and Table 9 for the fit statistics after having made necessary adjustments. Findings can be summarised as follows:

- (1) The population included in this analysis presented a very good targeting to the scale (Table 7).
- (2) The item reliability was high but inflated at beginning of the analysis because of item dependencies ( $PSI = 0.95$ , Cronbach  $\alpha = 0.96$ ). Reliability was still found to be good also after adjustments were made ( $PSI = 0.87$ , Cronbach  $\alpha = 0.87$ ).
- (3) The response thresholds of fourteen of the items of the WHODAS questionnaire presented disordering (Figure 5). Small sample size and locally dependent items can be explanations for the disordering as well as a lack of discrimination between the degree of disability across the first two response options, i.e., answer categories “None” and “Mild”. Figure 7 shows the range of assessment with the testlets that aggregate the items by domains.

**Table 7: Targeting and Reliability of WHODAS items**

	<b>Targeting</b>			
	<i>Start</i>		<i>Final</i>	
	Mean	SD	Mean	SD
<b>Difficulty</b>	0.50	1.03	0.17	0.61
<b>Ability</b>	0.00	0.92	0.00	0.34
	PSI	Alpha	PSI	Alpha
<b>Reliability</b>	0.95	0.96	0.87	0.87

Figure 5: Person item map before collapsing of response options



\*indicate disordered thresholds

- (4) The analysis of the residual dependencies showed strong local dependencies among the 32 items of the WHODAS questionnaire (Figure 6), with a tendency of questionnaire items from the same domain to associate. To address these dependencies, items were aggregated taking into account the chapter structure. Residual correlations above the cut-off were found between domain 2 (General Tasks and Demands) and domain 3 (Communication), which were then aggregated accordingly. The thresholds of the testlets are not expected to be ordered.
- (5) The item fit is good if the infit and outfit values are below 1.2. Four out of the 32 items showed misfit with infit or outfit above the cut-off: D1.5 - Generally understanding what people say?, D3.3 - Eating?, D6.4 - How much time did you spend on your health condition or its consequences, and D6.6 - How much has your health been a drain on the financial resources of you or your family?. After aggregation, all testlets showed good infit and outfit values, below 1.2.
- (6) The principal component analysis indicated that the items cluster by domains which results in multidimensionality, with a 1<sup>st</sup> eigenvalue of 5.32 and a 2<sup>nd</sup> eigenvalue of 3.41. After adjustments, i.e., aggregation of items by WHODAS domains, the 1<sup>st</sup> eigenvalue dropped to 1.74 and the 2<sup>nd</sup> eigenvalue of 1.32 and indicated unidimensionality according to the defined criteria.

**Figure 6: Local Item Dependencies before creation of testlets**

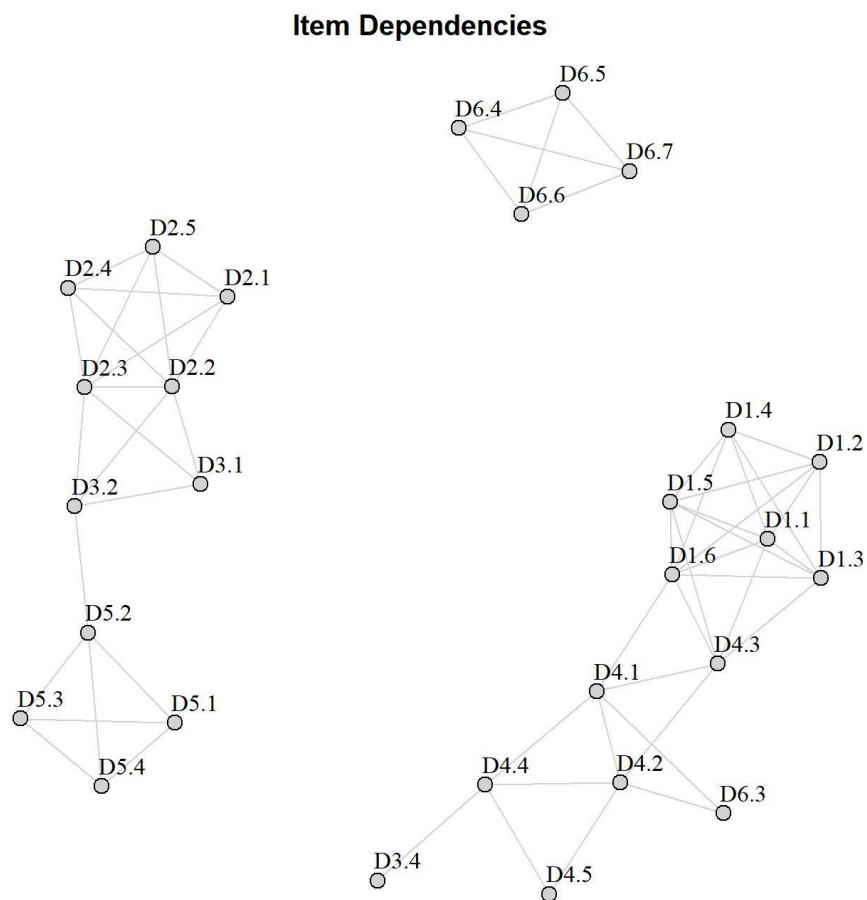
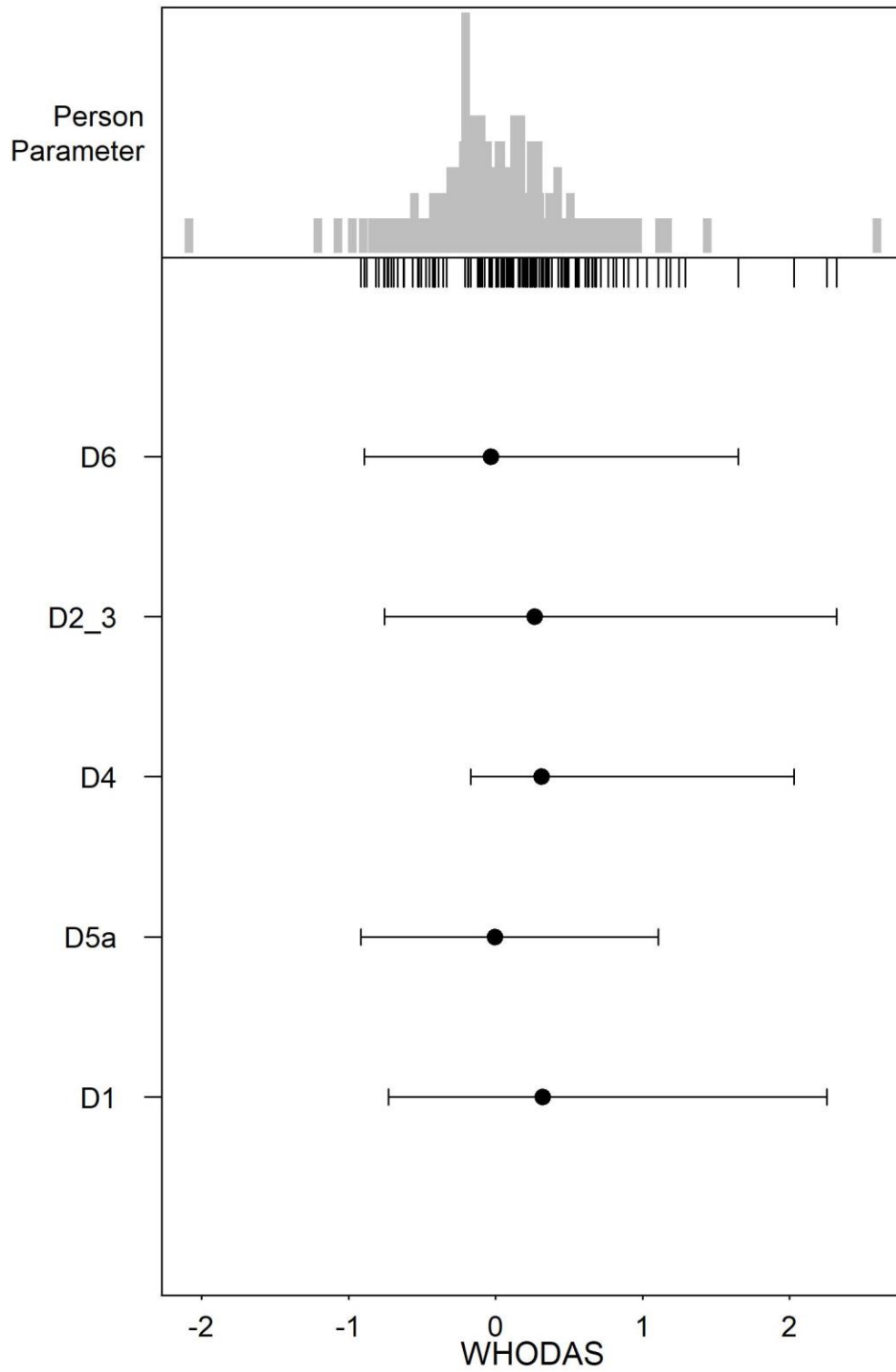


Figure 7: Person item map after solving dependencies by aggregating items by domains



**Table 8: WHODAS properties at start: item difficulties, fit (outfit and infit), local item dependencies, and differential item functioning**

WHODAS Item Nbr.	Outfit <sup>1</sup>	Infit <sup>1</sup>	Item Difficulty	Disordered Thresholds	LID <sup>3</sup>
D1.1	1.04	1.04	0.85		D1.2, D1.3, D1.4, D1.5, D1.6, D4.3
D1.2	1.07	1.04	0.90		D1.1, D1.3, D1.4, D1.5, D1.6
D1.3	0.95	0.95	0.81		D1.1, D1.2, D1.4, D1.5, D1.6, D4.3
D1.4	0.97	0.94	0.74		D1.1, D1.2, D1.3, D1.5, D1.6
D1.5	1.31	1.12	1.38	x	D1.1, D1.2, D1.3, D1.4, D1.6, D4.3
D1.6	1.14	1.07	1.26	x	D1.1, D1.2, D1.3, D1.4, D1.5, D4.1, D4.3
D2.1	1.00	0.98	0.11		D1.1, D1.3, D1.5, D1.6, D4.1, D4.2
D2.2	1.05	1.03	0.67		D1.6, D4.2, D4.3, D4.4, D6.3
D2.3	0.87	0.93	1.21		D2.2, D2.3, D2.4, D2.5
D2.4	0.74	0.77	0.56	x	D2.1, D2.3, D2.4, D2.5, D3.1, D3.2
D2.5	0.96	0.94	-0.33		D2.1, D2.2, D2.4, D2.5, D3.1, D3.2
D3.1	0.76	0.82	0.82	x	D2.1, D2.2, D2.3, D2.5
D3.2	0.74	0.80	1.06		D2.1, D2.2, D2.3, D2.4
D3.3	1.25	1.15	1.55		D2.2, D2.3, D3.2
D3.4	0.85	0.87	0.63	x	D2.2, D2.3, D3.1, D5.2
D4.1	0.95	0.98	0.89	x	D3.2, D5.1, D5.3, D5.4
D4.2	0.87	0.92	1.05	x	
D4.3	1.10	1.02	1.50	x	D4.4
D4.4	0.91	0.95	0.49	x	D3.4, D4.1, D4.2, D4.5
D4.5	1.15	1.14	0.27	x	D4.1, D4.3, D4.4, D4.5, D6.3
D5.1	0.70	0.71	0.33		D4.1, D4.2
D5.2	0.66	0.67	0.10		D4.2, D4.4
D5.3	0.68	0.70	0.00		D5.2, D5.3, D5.4
D5.4	0.69	0.71	-0.44		D5.1, D5.2, D5.4
D6.1	0.94	0.96	-0.07	x	D5.1, D5.2, D5.3
D6.2	0.91	0.92	0.57		
D6.3	1.06	1.09	0.85	x	
D6.4	1.29	1.26	-0.48		D6.5, D6.6, D6.7
D6.5	1.19	1.19	-0.86	x	D6.4, D6.6, D6.7
D6.6	1.31	1.31	-0.15		D6.4, D6.5, D6.7
D6.7	1.05	1.06	-0.09		D6.4, D6.5, D6.6
D6.8	1.03	1.01	-0.26	x	

1 Infit and Outfit expected below 1.2 for the absence of underfit

2 In testlets, i.e. aggregated locally dependent items, the ordering of thresholds is not expected anymore

3 Local item dependency (LID) significant with  $r > (\text{mean}(Q3) + 0.2)$



**Table 9: WHODAS properties after the necessary adjustment: item difficulties, fit (outfit and infit), local item dependencies, and differential item functioning**

WHODAS Item Nbr.	Label	Outfit <sup>1</sup>	Infit <sup>1</sup>	Item Difficulty	Disordered Thresholds	LID <sup>3</sup>
<b>Testlet 1</b>	D1.1-D1.6	1.10	1.11	0.32	n.a. <sup>2</sup>	no
<b>Testlet 2</b>	D2.1-D2.5 & D3.1-D3.4	0.73	0.75	0.27	n.a. <sup>2</sup>	no
<b>Testlet 3</b>	D4.1-D4.5	0.76	0.80	0.31	n.a. <sup>2</sup>	no
<b>Testlet 4</b>	D5.1-D5.4	0.65	0.66	-0.01		no
<b>Testlet 5</b>	D6.1-D6.8	0.72	0.71	-0.03	n.a. <sup>2</sup>	no

1 Infit and Outfit expected below 1.2 for the absence of underfit

2 In testlets, i.e. aggregated locally dependent items, the ordering of thresholds is not expected anymore

3 Local item dependency (LID) significant with  $r > (\text{mean}(Q3) + 0.2)$

### 3.2. WHODAS score transformation

Finally, Table 10 shows the score transformation table derived from the data collected in Italy, as an example. The table includes logit-scaled Rasch ability estimates and rescaled user-friendly scores on a scale from 0 to 100. The table allows recoding scores from the 32 WHODAS items into a psychometrically sound interval-scaled metric. The validity of the transformations can be challenged, as the suggested conversion is based on the data from just the three regions included in this mid-pilot evaluation.

Table 10: WHODAS score transformation table

WHODAS Score	Rasch Logit	0-100 Score	WHODAS* Score	Rasch* Logit	0-100* Score
32	-2.08	0	96	0.11	46
33	-1.62	10	97	0.12	46
34	-1.29	16	98	0.14	46
35	-1.16	19	99	0.15	46
36	-1.06	21	100	0.16	47
37	-0.99	23	101	0.17	47
38	-0.92	24	102	0.18	47
39	-0.86	25	103	0.2	47
40	-0.82	26	104	0.21	48
41	-0.77	27	105	0.22	48
42	-0.73	28	106	0.23	48
43	-0.69	29	107	0.25	48
44	-0.65	30	108	0.26	49
45	-0.62	30	109	0.28	49
46	-0.59	31	110	0.29	49
47	-0.56	32	111	0.3	50
48	-0.53	32	112	0.32	50
49	-0.5	33	113	0.33	50
50	-0.48	33	114	0.35	50
51	-0.46	34	115	0.36	51
52	-0.43	34	116	0.38	51
53	-0.41	35	117	0.4	51
54	-0.39	35	118	0.41	52
55	-0.37	35	119	0.43	52
56	-0.36	36	120	0.45	53
57	-0.34	36	121	0.47	53
58	-0.32	37	122	0.49	53
59	-0.31	37	123	0.5	54
60	-0.29	37	124	0.52	54
61	-0.28	37	125	0.55	55
62	-0.26	38	126	0.57	55
63	-0.25	38	127	0.59	55
64	-0.24	38	128	0.61	56
65	-0.22	39	129	0.64	56
66	-0.21	39	130	0.66	57
67	-0.2	39	131	0.68	57
68	-0.19	39	132	0.71	58
69	-0.17	40	133	0.73	58
70	-0.16	40	134	0.76	59
71	-0.15	40	135	0.78	59
72	-0.14	40	136	0.81	60
73	-0.13	41	137	0.83	60
74	-0.12	41	138	0.85	61
75	-0.11	41	139	0.88	61
76	-0.1	41	140	0.9	62
77	-0.09	41	141	0.93	62
78	-0.08	42	142	0.95	63
79	-0.07	42	143	0.98	64
80	-0.06	42	144	1	64
81	-0.05	42	145	1.03	65
82	-0.03	43	146	1.05	65
83	-0.03	43	147	1.08	66
84	-0.01	43	148	1.11	66
85	0	43	149	1.14	67
86	0.01	43	150	1.17	68
87	0.02	44	151	1.21	68
88	0.03	44	152	1.25	69
89	0.04	44	153	1.29	70
90	0.05	44	154	1.34	71
91	0.06	44	155	1.38	72
92	0.07	45	156	1.44	73
93	0.08	45	157	1.59	76
94	0.09	45	158	1.88	82
95	0.1	45	159	2.28	91
96	0.11	46	160	2.73	100

# 4. Comparing WHODAS scores and Civil Invalidation ratings

## 4.1. Meaningful cut-off points

There are, to our knowledge, no agreed and published cut-offs for the WHODAS score that would be applicable to a population with diverse health conditions to categorize the severity of their disability. Having established cut-offs would allow to easily detect individuals with significant disabilities and to reflect and, eventually, reconsider attributed civil invalidity percentages. Some studies report the 90<sup>th</sup> or 95<sup>th</sup> percentile of the WHODAS score distribution as being the best cut-off to diagnose severe disability or dysfunctionality in some specific groups, such as post-partum women (Mayrink et al., 2018) or the elderly population (Ferrer et al., 2019). A minimal clinically important difference in scores for the WHODAS has not been established yet (Federici et al., 2017). However, based on several previous and comparable pilots projects conducted by the World Bank using the WHODAS questionnaire, in Greece, Latvia, Lithuania, and Bulgaria, meaningful WHODAS disability cut-off points for the Rasch-based 0-100 score are suggested as follows:

- Score 0-25: No functioning restrictions
- Score 26-40: Moderate functioning restrictions
- Score 41-60: Severe functioning restrictions
- Score 61-100: Very severe (profound) functioning restrictions

A score of 40 would thus be the central cut-off for determining the presence of a disability and, thus, eligibility for services. In total, the sample presented N = 18 (1.26%) of individuals having no functioning restrictions, N = 440 (30.9%) of individuals with moderate functioning restrictions, N = 948 (66.6%) of individuals with severe functioning restrictions, and N = 18 (1.26%) of individuals with very severe functioning restrictions.

The civil invalidity percentages attributed to persons with health problems in Italy, following the assessment, can be divided into different categories in various ways. While there are no cut-off points for a discretionary assessment, entitlement for a number of benefits and supports suggest the following as a meaningful split:

- 0-33%: no invalidity
- 34-66%: moderate invalidity, of which
  - 34-45%: lower moderate invalidity
  - 46-66%: higher moderate invalidity
- 67-99%: severe invalidity, of which
  - 67-73%: lower severe invalidity
  - 74-99%: higher severe invalidity
- 100%: very severe (profound) invalidity

In total, the mid-pilot sample presented N = 88 (6.3%) of individuals with no invalidity, N = 490 (35.2%) of individuals with moderate invalidity, N = 515 (37%) of individuals with severe invalidity, and N = 299 (21.5%) of individuals with very severe invalidity rated as 100%. Further dividing the groups, according to the above

suggested scale, returns N = 88 (6.3%) of individuals with a lower moderate invalidity and N = 403 (28.9%) with a higher moderate invalidity. Liekwise, N = 195 individuals (14%) with a lower severe invalidity and N = 320 (23%) of individuals with a higher severe invalidity. The different levels of invalidity are key to obtain different benefits from Italys social protection system. For example, with a civil invalidity percentage above 46%, individuals can request employment support, with more than 67% prostheses are provided free of charge, and with more than 74% people can receive a non-contributory disability allowance.

## 4.2. Sample characteristics according to cut-off points

Table 11 presents the socio-demographic characteristics of the sample disaggregated by level of disability based on the WHODAS score. The percentage of men was higher in the two rather small extreme groups of no and very severe disability and below 50% otherwise. There is a statistically significant increase in mean age (p-value < 0.001) across disability levels from 43.3 years with no disability to 53.5 years with very severe disability. The average number of years of education, on the other hand, decreased significantly with increasing disability status (p-value < 0.001) from 12.9 years with no disability to 9.7 years with very severe disability. Only 66.7% of participants with very severe disability lived independently in the community, while this share was close above 90% for all other groups. The percentage of persons in paid work decreased from 36.7% in the group with no disability to 22% for those with very severe disability.

**Table 11: Sample descriptive statistics by disability severity based on WHODAS questionnaire**

	No	Moderate	Severe	Very severe
<b>N</b>	30	472	951	21
<b>Gender = Male (%)</b>	21 (70.0)	231 (49.0)	411 (43.2)	12 (57.1)
<b>Age – mean (SD)</b>	43.33 (16.90)	50.45 (11.99)	52.59 (10.86)	53.48 (11.61)
<b>Years of Education – mean (SD)</b>	12.87 (3.41)	11.76 (3.73)	10.98 (3.55)	9.71 (3.73)
<b>Living condition (%)</b>				
Independent in the community	30 (100.0)	469 (99.4)	914 (96.1)	14 (66.7)
Assisted living	0 (0.0)	3 (0.6)	37 (3.9)	7 (33.3)
Hospitalized	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
<b>Marital status (%)</b>				
Never married	12 (40.0)	122 (25.8)	218 (22.9)	7 (33.3)
Currently married	13 (43.3)	278 (58.9)	544 (57.3)	7 (33.3)
Separated	1 (3.3)	28 (5.9)	54 (5.7)	2 (9.5)
Divorced	4 (13.3)	21 (4.4)	61 (6.4)	1 (4.8)
Widowed	0 (0.0)	12 (2.5)	41 (4.3)	2 (9.5)
Cohabiting	0 (0.0)	11 (2.3)	32 (3.4)	2 (9.5)
<b>Work Status (%)</b>				
Paid work	11 (36.7)	190 (40.3)	290 (30.6)	4 (19.0)
Self-employed	4 (13.3)	28 (5.9)	46 (4.8)	0 (0.0)
Non-paid work	0 (0.0)	0 (0.0)	1 (0.1)	0 (0.0)
Student	5 (16.7)	23 (4.9)	14 (1.5)	0 (0.0)
Keeping house	1 (3.3)	52 (11.0)	86 (9.1)	1 (4.8)
Retired	2 (6.7)	17 (3.6)	77 (8.1)	2 (9.5)
Unemployed (health reasons)	0 (0.0)	60 (12.7)	192 (20.2)	10 (47.6)
Unemployed (other reasons)	7 (23.3)	98 (20.8)	241 (25.4)	3 (14.3)
Other	0 (0.0)	4 (0.8)	2 (0.2)	1 (4.8)

Table 12 presents the socio-demographic characteristics of the sample disaggregated by the level of civil invalidity, following the above-proposed cut-off categories. The percentage of men is similar and below 50% in all impairment of invalidity categories. Again, there is a statistically significant increase in the mean age ( $p$ -value < 0.001) across degrees of civil invalidity, from 50 years in the group with no invalidity to 54 years in the group with very severe invalidity. The average number of years of education is slightly above 11 years across all invalidity levels. The share of people living independently in the community is about 90% among those with very severe invalidity and close to 100% for the other groups. Finally, the percentage of persons in paid work is very similar across the four categories and highest for those with moderate level of invalidity.

**Table 12 : Sample descriptive statistics by impairment severity based on civil invalidity assessment**

	No	Moderate	Severe	Very severe
<b>N</b>	88	490	515	299
<b>Gender = Male (%)</b>	40 (45.5)	213 (43.5)	251 (48.8)	137 (45.8)
<b>Age – mean (SD)</b>	50.27 (13.89)	49.71 (12.16)	52.84 (10.80)	54.34 (9.46)
<b>Years in education – mean (SD)</b>	11.67 (4.08)	11.27 (3.54)	11.19 (3.76)	11.10 (3.49)
<b>Living condition (%)</b>				
Independent in the community	88 (100.0)	484 (98.8)	503 (97.7)	270 (90.3)
Assisted living	0 (0.0)	6 (1.2)	12 (2.3)	29 (9.7)
Hospitalized	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
<b>Marital Status (%)</b>				
Never married	32 (36.4)	124 (25.3)	114 (22.1)	63 (21.1)
Currently married	35 (39.8)	285 (58.2)	303 (58.8)	175 (58.7)
Separated	5 (5.7)	28 (5.7)	32 (6.2)	18 (6.0)
Divorced	10 (11.4)	25 (5.1)	28 (5.4)	16 (5.4)
Widowed	3 (3.4)	18 (3.7)	19 (3.7)	14 (4.7)
Cohabiting	3 (3.4)	10 (2.0)	19 (3.7)	12 (4.0)
<b>Work Status (%)</b>				
Paid work	26 (29.5)	192 (39.2)	161 (31.3)	85 (28.5)
Self-employed	3 (3.4)	28 (5.7)	26 (5.1)	17 (5.7)
Non-paid work	1 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)
Student	7 (8.0)	19 (3.9)	8 (1.6)	4 (1.3)
Keeping house	6 (6.8)	43 (8.8)	55 (10.7)	27 (9.1)
Retired	7 (8.0)	11 (2.2)	31 (6.0)	44 (14.8)
Unemployed (health reasons)	24 (27.3)	78 (15.9)	95 (18.5)	52 (17.4)
Unemployed (other reasons)	14 (15.9)	115 (23.5)	137 (26.7)	67 (22.5)
Other	0 (0.0)	4 (0.8)	1 (0.2)	2 (0.7)

### 4.3. Pathologies, WHODAS scores and civil invalidity ratings

Table 13 presents the mean WHODAS score, on the 0-100 scale, disaggregated by health conditions, and as a memorandum item also the distribution of the population across the 22 ICD-11 chapters. Based on the ratings of 24 individuals, the category “symptoms, signs or clinical findings that could not be classified elsewhere” resulted in the highest mean WHODAS score of 47.82 (SD = 13.3). The least disabling condition as measured by the WHODAS score are diseases of the respiratory system with a mean score of 39.71 (SD = 10.27); these were reported by 54 participants. Among the big four pathologies, “mental, behavioural or neurodevelopmental disorders” stand out with a mean WHODAS score above 45 while the other three (neoplasms, circulatory system, musculoskeletal system) all have means scores at or around 43.

**Table 13: Frequency and percentage of ICD chapters and corresponding mean and standard deviation (SD) of the WHODAS scores**

	N	Mean(SD)
1 Certain infectious or parasitic diseases	4(0.25%)	44.28 (7.99)
2 Neoplasms	283(17.35%)	43.89 (7.38)
3 Diseases of the blood or blood-forming organs	4(0.25%)	45.68 (6.51)
4 Diseases of the immune system	15(0.92%)	41.18 (5.69)
5 Endocrine, nutritional or metabolic diseases	85(5.21%)	43.36 (6.94)
6 Mental, behavioural or neurodevelopmental disorders	257(15.76%)	45.05 (7.29)
8 Diseases of the nervous system	90(5.52%)	44.53 (8.79)
9 Diseases of the visual system	31(1.9%)	42.3 (7.65)
10 Diseases of the ear or mastoid process	44(2.7%)	41.69 (7.63)
11 Diseases of the circulatory system	262(16.06%)	42.64 (8.13)
12 Diseases of the respiratory system	54(3.31%)	39.71 (10.27)
13 Diseases of the digestive system	67(4.11%)	42.1 (7.2)
14 Diseases of the skin	2(0.12%)	41.79 (9.66)
15 Diseases of the musculoskeletal system and diseases of connective tissue	319(19.56%)	42.46 (6.96)
16 Diseases of the genitourinary system	24(1.47%)	41.05 (9.46)
20 Developmental anomalies	3(0.18%)	43.76 (13.42)
21 Symptoms, signs or clinical findings, not elsewhere classified	24(1.47%)	47.82 (13.3)
22 Injury, poisoning or certain other consequences of external causes	10(0.61%)	44.64 (6.68)

Table 14 disaggregates the sample by pathology and degree of civil invalidity. By and large, the results show that WHODAS scores tend to increase with the invalidity degree for most pathologies although the results must be interpreted with caution, due to the small number of cases in several of the categories. However, this is not a consistent finding and there are many exceptions. It is not the same condition which consistently receives the highest WHODAS rating. Looking at the four main pathologies only, for which the sample size is large enough to draw reliable conclusions, the following can be observed:

- Diseases of the musculoskeletal system are the dominant pathology among people with moderate levels of invalidity (30% of those with degree 34-66%). For those diseases, mean WHODAS scores clearly and gradually increase with the degree of invalidity, from around 38 to over 50.
- Neoplasms are the dominant pathology among people with very severe levels of invalidity (46% of those with a degree of 100%). Mean WHODAS scores are lower than for the other main diseases, at all invalidity levels.
- Diseases of the circulatory system are particularly frequent at the two middle invalidity categories, moderate and severe disability (i.e., degree 34-99%). Mean WHODAS scores generally lie between those for neoplasms and for diseases of the musculoskeletal system.
- Mental, behavioural or neurodevelopmental disorders are more equally distributed across invalidity levels and their mean WHODAS scores tend to be higher than for the other main diseases.
- While mean WHODAS scores increase with the degree of invalidity, for three of the pathologies (all but musculoskeletal disorders) the – in some cases small – group with ‘no invalidity’ (score 0-33%) has an unexpectedly high mean WHODAS score, even higher than those with severe invalidity.



**Table 14: Frequency and percentage of ICD chapters by degree of invalidity and corresponding mean and standard deviation (SD) of the corresponding WHODAS scores**

	No invalidity (0-33%)		Moderate invalidity (34-66%)		Severe invalidity (67-99%)		Very severe invalidity (100%)	
	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)
1 Certain infectious or parasitic diseases	1(1.37%)	42.21 (-)	1(0.18%)	43.07 (-)	1(0.15%)	36.42 (-)	1(0.3%)	55.42 (-)
2 Neoplasms	6(8.22%)	43.74 (5.6)	29(5.18%)	39.64 (6.58)	91(13.79%)	41.57 (6.82)	154(45.97%)	46.13 (7.2)
3 Diseases of the blood or blood-forming organs	1(1.37%)	42.21 (-)	1(0.18%)	42.86 (-)	1(0.15%)	42.21 (-)	1(0.3%)	55.42 (-)
4 Diseases of the immune system			5(0.89%)	37.47 (5.41)	8(1.21%)	41.61 (4.51)	2(0.6%)	48.75 (2.83)
5 Endocrine, nutritional or metabolic diseases	1(1.37%)	42.21 (-)	31(5.54%)	39.96 (6.96)	43(6.52%)	44.86 (6.38)	10(2.99%)	47.56 (5.33)
6 Mental, behavioural or neurodevelopmental disorders	15(20.55%)	46.58 (6.95)	81(14.46%)	41.19 (6.6)	119(18.03%)	45.31 (6.12)	42(12.54%)	51.21 (7.27)
8 Diseases of the nervous system	6(8.22%)	47.98 (11.52)	22(3.93%)	40.09 (7.83)	36(5.45%)	42.73 (7.68)	26(7.76%)	49.97 (7.65)
9 Diseases of the visual system	2(2.74%)	32.64 (12.62)	14(2.5%)	39.87 (7.01)	14(2.12%)	46.08 (6.13)	1(0.3%)	42.86 (-)
10 Diseases of the ear or mastoid process	5(6.85%)	39.58 (5.72)	30(5.36%)	40.8 (7.67)	6(0.91%)	44.9 (7.25)	3(0.9%)	47.61 (9.76)
11 Diseases of the circulatory system	4(5.48%)	48.04 (9.76)	102(18.21%)	40.28 (6.61)	127(19.24%)	42.99 (8.08)	29(8.66%)	48.7 (9.55)
12 Diseases of the respiratory system			32(5.71%)	37.06 (12.12)	20(3.03%)	43.53 (4.96)	2(0.6%)	43.94 (3.98)
13 Diseases of the digestive system	4(5.48%)	42.73 (5.27)	12(2.14%)	36.58 (6.98)	39(5.91%)	41.64 (5.97)	12(3.58%)	48.92 (6.85)
14 Diseases of the skin	1(1.37%)	34.96 (-)			1(0.15%)	48.63 (-)		
15 Diseases of the musculoskeletal system or the connective tissue	14(19.18%)	37.67 (7.04)	171(30.54%)	40.97 (6.68)	110(16.67%)	43.64 (6.2)	24(7.16%)	50.48 (4.95)
16 Diseases of the genitourinary system	2(2.74%)	47.36 (5.76)	3(0.54%)	34.21 (3.55)	12(1.82%)	37.49 (8.03)	7(2.09%)	48.29 (9.6)
20 Developmental anomalies					2(0.3%)	36.21 (4.31)	1(0.3%)	58.86 (-)
21 Symptoms/clinical findings not elsewhere classified	6(8.22%)	41.14 (19.73)	2(0.36%)	42.63 (5.12)	7(1.06%)	43.83 (8.99)	9(2.69%)	56.53 (7.87)
22 Injury, poisoning or certain other consequences of external causes	3(4.11%)	42.57 (1.66)	3(0.54%)	43.61 (10.73)	4(0.61%)	46.95 (6.53)		

#### 4.4. Comparing WHODAS scores and civil invalidity ratings

The following figures deepen the comparison between the results of the WHODAS questionnaire and the civil invalidity assessment. Figure 8 looks at the distribution of WHODAS scores at different levels of invalidity, according to the above-chosen cut-off points, for the full sample and Figures 9-11 look at the same information for each of the three regions. To some extent, it could be expected that a measure of the degree of disability and a measure of the degree of invalidity, or impairment, are associated at some level. The main finding, however, is that this is not the case. Disability according to the ICF is a dimension that is very different from what is measured in the assessment process of civil invalidity in Italy.

**Figure 8: WHODAS score distributions at respective civil-invalidity cut-offs: full sample**

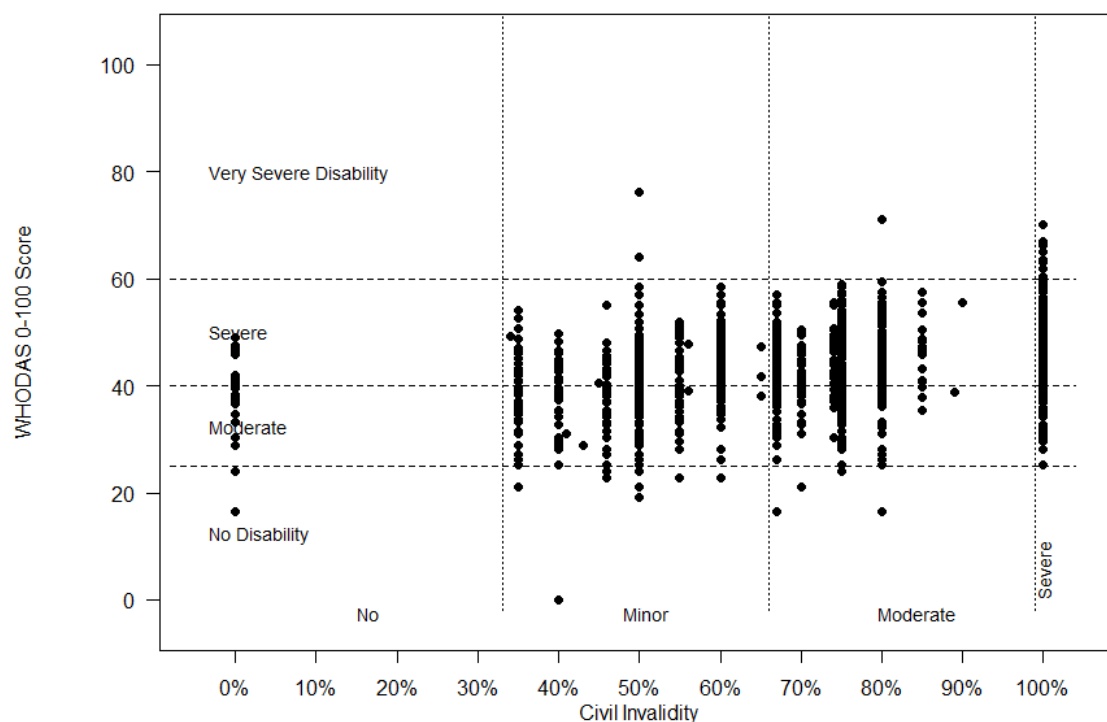


Figure 8 shows the distribution of the data points for the WHODAS score and the civil invalidity percentage for the full sample. The horizontal lines represent the cut-offs for the WHODAS score – from no disability to moderate, severe and very severe disability. These scores have a weak positive correlation of  $R = 0.39$ . Higher invalidity levels tends to go along with higher WHODAS scores. Some notable exceptions can be observed on the plot, however, with individuals having 0% of civil invalidity while reporting moderate and sometimes even severe disability according to the WHODAS questionnaire. Similarly, some individuals with a civil invalidity percentage above 66% (severe or very severe invalidity) would be found having no disability based on the WHODAS score.

Figures 9-11 show that the results are similar for all regions although Sardinia stands out as a region in which both civil invalidity ratings and WHODAS scores are more concentrated in the middle (e.g., most individuals have minor to moderate civil invalidity and none of them presented very severe disability based on WHODAS). The resulting correlation between WHODAS scores and civil invalidity ratings is particularly low in Sardinia ( $R = 0.2$ ), compared with a correlation of  $R = 0.38$  in Campania and  $R = 0.42$  in Lombardy. Campania is the biggest region included in this interim evaluation with  $N = 950$  interviews.

Figure 9: WHODAS score distributions at respective civil-invalidity cut-offs: Campania

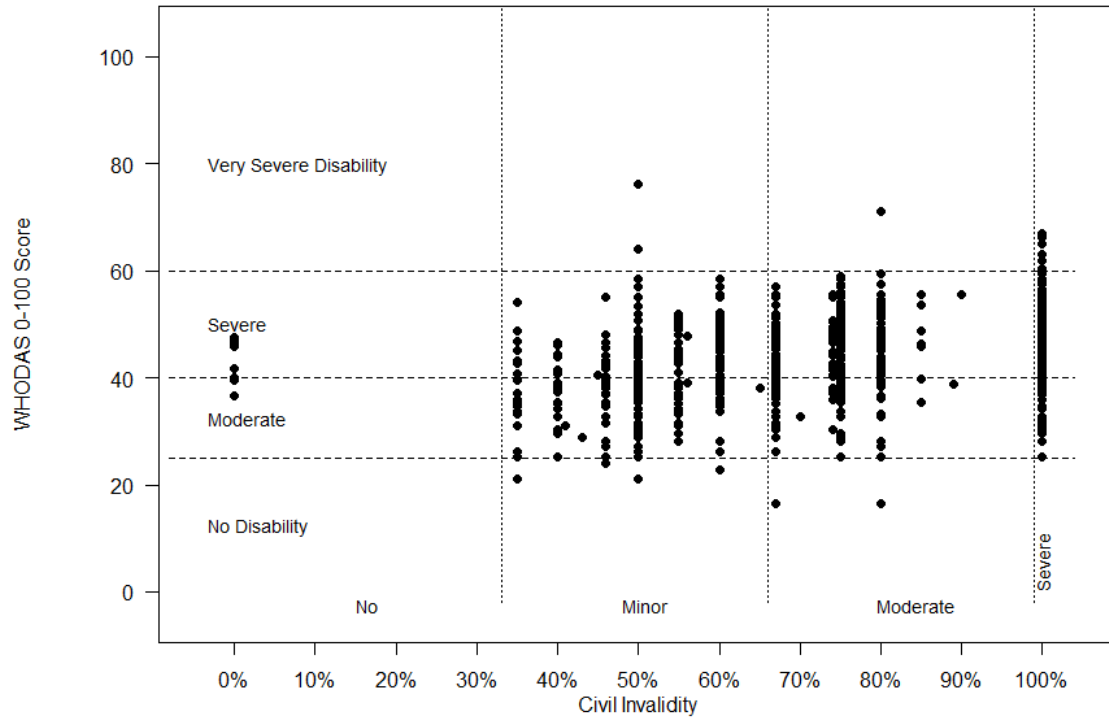


Figure 10: WHODAS score distributions at respective civil-invalidity cut-offs: Sardinia

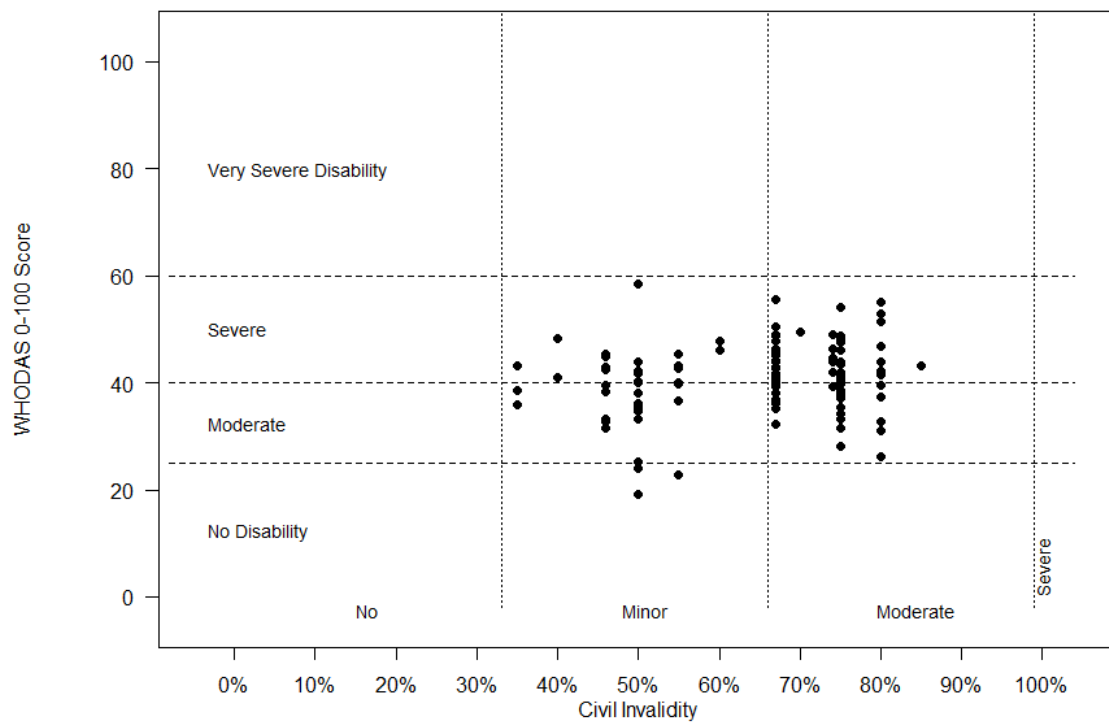
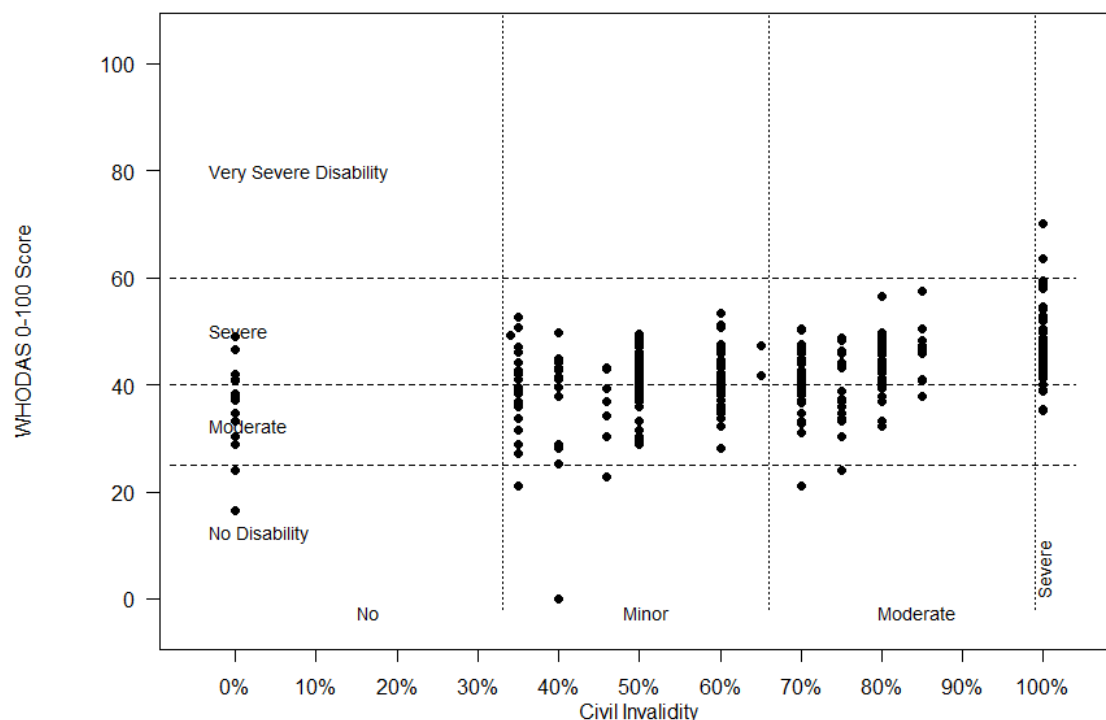


Figure 11: WHODAS score distributions at respective civil-invalidity cut-offs: Lombardy



#### 4.5. Concluding remarks

This interim mid-pilot evaluation shows very clearly and convincingly that the concept of disability based on functioning (WHODAS) and the concept of civil invalidity in Italy based on impairment are hugely different. This is not surprising because one tries to assess the level of activity and participation and the kind and nature of problems people have in a scientifically tested way, while the other limits itself to assessing the existence, or discretionarily perceived existence, of a medical condition. The large difference between the two concepts demonstrates the critical importance of the inclusion of functioning into Italy's disability assessment. This will contribute to a better identification of the group of people needing support, a better targeting of costly benefits and services, and a better link with regional and local needs assessments.

This interim pilot evaluation is based on over 1400 participants, a sample that is large enough to assess the robustness of the WHODAS questionnaire and the quality of the results. The findings which are in line with those of similar pilots run in other European countries show that the piloted WHODAS assessment has been implemented successfully in all three regions. The full evaluation report, which will be based on a sample of more than 4000 participants from four regions of Italy (including Trentino and larger samples in the other three regions, especially in Lombardy), will provide even more robust findings and will probably allow deeper analysis by region, pathology and other population characteristics.

The full evaluation will also go a step further in discussing different ways in which functioning information provided by the WHODAS questionnaire could be combined with the current assessment of civil invalidity. This could be done in many different ways, including by mathematically merging the two assessments to create a new ultimate percentage of invalidity or by using the WHODAS information to flag to the assessors that additional issues arise that must be taken into account. The most extreme approach – to replace the current civil invalidity assessment altogether by a WHODAS-based assessment of functioning – is probably neither legally possible nor politically feasible, nor practically desirable. It is a political choice to decide on the degree to which functioning elements will determine the disability degree and, thereby, entitlement to various disability benefits and services available in Italy.

## Annex A. Region specific distributions

Table A.1.: Frequencies and Percentages of WHODAS Responses: Campania

Item	No	Mild	Moderate	Severe	Extreme, cannot do	Missing
D1.1	321 (33.79%)	208 (21.89%)	220 (23.16%)	171 (18%)	22 (2.32%)	8 (0.84%)
D1.2	340 (35.79%)	198 (20.84%)	231 (24.32%)	154 (16.21%)	23 (2.42%)	4 (0.42%)
D1.3	328 (34.53%)	189 (19.89%)	244 (25.68%)	162 (17.05%)	24 (2.53%)	3 (0.32%)
D1.4	306 (32.21%)	185 (19.47%)	203 (21.37%)	154 (16.21%)	51 (5.37%)	51 (5.37%)
D1.5	425 (44.74%)	202 (21.26%)	184 (19.37%)	124 (13.05%)	12 (1.26%)	3 (0.32%)
D1.6	421 (44.32%)	180 (18.95%)	180 (18.95%)	147 (15.47%)	17 (1.79%)	5 (0.53%)
D2.1	112 (11.79%)	190 (20%)	214 (22.53%)	286 (30.11%)	95 (10%)	53 (5.58%)
D2.2	269 (28.32%)	210 (22.11%)	174 (18.32%)	266 (28%)	28 (2.95%)	3 (0.32%)
D2.3	329 (34.63%)	231 (24.32%)	239 (25.16%)	139 (14.63%)	10 (1.05%)	2 (0.21%)
D2.4	224 (23.58%)	156 (16.42%)	278 (29.26%)	238 (25.05%)	50 (5.26%)	4 (0.42%)
D2.5	73 (7.68%)	103 (10.84%)	138 (14.53%)	326 (34.32%)	199 (20.95%)	111 (11.68%)
D3.1	260 (27.37%)	224 (23.58%)	215 (22.63%)	202 (21.26%)	47 (4.95%)	2 (0.21%)
D3.2	276 (29.05%)	230 (24.21%)	214 (22.53%)	165 (17.37%)	18 (1.89%)	47 (4.95%)
D3.3	454 (47.79%)	275 (28.95%)	165 (17.37%)	42 (4.42%)	10 (1.05%)	4 (0.42%)
D3.4	144 (15.16%)	72 (7.58%)	151 (15.89%)	160 (16.84%)	73 (7.68%)	350 (36.84%)
D4.1	297 (31.26%)	184 (19.37%)	205 (21.58%)	184 (19.37%)	41 (4.32%)	39 (4.11%)
D4.2	326 (34.32%)	196 (20.63%)	208 (21.89%)	168 (17.68%)	37 (3.89%)	15 (1.58%)
D4.3	511 (53.79%)	136 (14.32%)	138 (14.53%)	105 (11.05%)	12 (1.26%)	48 (5.05%)
D4.4	223 (23.47%)	153 (16.11%)	154 (16.21%)	198 (20.84%)	134 (14.11%)	88 (9.26%)
D4.5	166 (17.47%)	99 (10.42%)	163 (17.16%)	201 (21.16%)	141 (14.84%)	180 (18.95%)
D5.1	121 (12.74%)	184 (19.37%)	272 (28.63%)	288 (30.32%)	57 (6%)	28 (2.95%)
D5.2	86 (9.05%)	175 (18.42%)	264 (27.79%)	290 (30.53%)	79 (8.32%)	56 (5.89%)
D5.3	83 (8.74%)	170 (17.89%)	239 (25.16%)	302 (31.79%)	96 (10.11%)	60 (6.32%)
D5.4	50 (5.26%)	120 (12.63%)	180 (18.95%)	303 (31.89%)	201 (21.16%)	96 (10.11%)
D5.5	37 (3.89%)	65 (6.84%)	96 (10.11%)	75 (7.89%)	69 (7.26%)	608 (64%)
D5.6	46 (4.84%)	62 (6.53%)	95 (10%)	70 (7.37%)	68 (7.16%)	609 (64.11%)
D5.7	44 (4.63%)	57 (6%)	91 (9.58%)	72 (7.58%)	77 (8.11%)	609 (64.11%)
D5.8	30 (3.16%)	56 (5.89%)	54 (5.68%)	92 (9.68%)	66 (6.95%)	652 (68.63%)
D6.1	120 (12.63%)	138 (14.53%)	193 (20.32%)	247 (26%)	186 (19.58%)	66 (6.95%)
D6.2	210 (22.11%)	205 (21.58%)	223 (23.47%)	203 (21.37%)	63 (6.63%)	46 (4.84%)
D6.3	287 (30.21%)	187 (19.68%)	195 (20.53%)	214 (22.53%)	27 (2.84%)	40 (4.21%)
D6.4	22 (2.32%)	179 (18.84%)	158 (16.63%)	434 (45.68%)	104 (10.95%)	53 (5.58%)
D6.5	22 (2.32%)	133 (14%)	138 (14.53%)	455 (47.89%)	187 (19.68%)	15 (1.58%)
D6.6	58 (6.11%)	192 (20.21%)	181 (19.05%)	433 (45.58%)	75 (7.89%)	11 (1.16%)
D6.7	61 (6.42%)	193 (20.32%)	229 (24.11%)	379 (39.89%)	72 (7.58%)	16 (1.68%)
D6.8	80 (8.42%)	69 (7.26%)	187 (19.68%)	294 (30.95%)	277 (29.16%)	43 (4.53%)

Table A.2.: Frequencies and Percentages of WHODAS Responses: Sardinia

Item	No	Mild	Moderate	Severe	Extreme, cannot do	Missing
D1.1	36 (20.81%)	29 (16.76%)	58 (33.53%)	39 (22.54%)	11 (6.36%)	0 (0%)
D1.2	46 (26.59%)	27 (15.61%)	58 (33.53%)	36 (20.81%)	6 (3.47%)	0 (0%)
D1.3	48 (27.75%)	25 (14.45%)	49 (28.32%)	40 (23.12%)	11 (6.36%)	0 (0%)
D1.4	56 (32.37%)	19 (10.98%)	31 (17.92%)	36 (20.81%)	18 (10.4%)	13 (7.51%)
D1.5	98 (56.65%)	25 (14.45%)	26 (15.03%)	20 (11.56%)	4 (2.31%)	0 (0%)
D1.6	98 (56.65%)	25 (14.45%)	29 (16.76%)	15 (8.67%)	6 (3.47%)	0 (0%)
D2.1	47 (27.17%)	13 (7.51%)	41 (23.7%)	43 (24.86%)	28 (16.18%)	1 (0.58%)
D2.2	45 (26.01%)	22 (12.72%)	51 (29.48%)	39 (22.54%)	16 (9.25%)	0 (0%)
D2.3	79 (45.66%)	31 (17.92%)	35 (20.23%)	23 (13.29%)	5 (2.89%)	0 (0%)
D2.4	59 (34.1%)	22 (12.72%)	41 (23.7%)	35 (20.23%)	14 (8.09%)	2 (1.16%)
D2.5	36 (20.81%)	13 (7.51%)	37 (21.39%)	38 (21.97%)	48 (27.75%)	1 (0.58%)
D3.1	88 (50.87%)	19 (10.98%)	30 (17.34%)	30 (17.34%)	6 (3.47%)	0 (0%)
D3.2	81 (46.82%)	29 (16.76%)	36 (20.81%)	20 (11.56%)	7 (4.05%)	0 (0%)
D3.3	126 (72.83%)	14 (8.09%)	20 (11.56%)	10 (5.78%)	3 (1.73%)	0 (0%)
D3.4	95 (54.91%)	13 (7.51%)	21 (12.14%)	18 (10.4%)	22 (12.72%)	4 (2.31%)
D4.1	102 (58.96%)	23 (13.29%)	17 (9.83%)	10 (5.78%)	18 (10.4%)	3 (1.73%)
D4.2	118 (68.21%)	17 (9.83%)	21 (12.14%)	9 (5.2%)	2 (1.16%)	6 (3.47%)
D4.3	115 (66.47%)	22 (12.72%)	17 (9.83%)	14 (8.09%)	3 (1.73%)	2 (1.16%)
D4.4	98 (56.65%)	12 (6.94%)	18 (10.4%)	12 (6.94%)	13 (7.51%)	20 (11.56%)
D4.5	97 (56.07%)	12 (6.94%)	20 (11.56%)	14 (8.09%)	22 (12.72%)	8 (4.62%)
D5.1	54 (31.21%)	27 (15.61%)	35 (20.23%)	34 (19.65%)	21 (12.14%)	2 (1.16%)
D5.2	40 (23.12%)	31 (17.92%)	35 (20.23%)	40 (23.12%)	25 (14.45%)	2 (1.16%)
D5.3	38 (21.97%)	27 (15.61%)	46 (26.59%)	32 (18.5%)	28 (16.18%)	2 (1.16%)
D5.4	22 (12.72%)	20 (11.56%)	37 (21.39%)	42 (24.28%)	49 (28.32%)	3 (1.73%)
D5.5	12 (6.94%)	8 (4.62%)	23 (13.29%)	13 (7.51%)	5 (2.89%)	112 (64.74%)
D5.6	16 (9.25%)	10 (5.78%)	17 (9.83%)	15 (8.67%)	3 (1.73%)	112 (64.74%)
D5.7	16 (9.25%)	7 (4.05%)	22 (12.72%)	11 (6.36%)	4 (2.31%)	113 (65.32%)
D5.8	11 (6.36%)	9 (5.2%)	19 (10.98%)	12 (6.94%)	9 (5.2%)	113 (65.32%)
D6.1	45 (26.01%)	25 (14.45%)	23 (13.29%)	23 (13.29%)	51 (29.48%)	6 (3.47%)
D6.2	72 (41.62%)	19 (10.98%)	33 (19.08%)	30 (17.34%)	18 (10.4%)	1 (0.58%)
D6.3	99 (57.23%)	18 (10.4%)	23 (13.29%)	23 (13.29%)	9 (5.2%)	1 (0.58%)
D6.4	17 (9.83%)	26 (15.03%)	36 (20.81%)	71 (41.04%)	22 (12.72%)	1 (0.58%)
D6.5	12 (6.94%)	15 (8.67%)	20 (11.56%)	76 (43.93%)	50 (28.9%)	0 (0%)
D6.6	25 (14.45%)	18 (10.4%)	35 (20.23%)	65 (37.57%)	28 (16.18%)	2 (1.16%)
D6.7	31 (17.92%)	23 (13.29%)	40 (23.12%)	54 (31.21%)	22 (12.72%)	3 (1.73%)
D6.8	34 (19.65%)	24 (13.87%)	34 (19.65%)	50 (28.9%)	29 (16.76%)	2 (1.16%)

Table A.3.: Frequencies and Percentages of WHODAS Responses: Lombardy

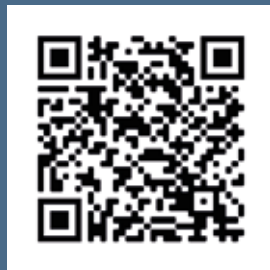
Item	No	Mild	Moderate	Severe	Extreme, cannot do	Missing
D1.1	104 (29.63%)	87 (24.79%)	95 (27.07%)	53 (15.1%)	12 (3.42%)	0 (0%)
D1.2	101 (28.77%)	109 (31.05%)	75 (21.37%)	48 (13.68%)	18 (5.13%)	0 (0%)
D1.3	100 (28.49%)	96 (27.35%)	84 (23.93%)	48 (13.68%)	23 (6.55%)	0 (0%)
D1.4	125 (35.61%)	88 (25.07%)	70 (19.94%)	45 (12.82%)	21 (5.98%)	2 (0.57%)
D1.5	195 (55.56%)	84 (23.93%)	50 (14.25%)	15 (4.27%)	7 (1.99%)	0 (0%)
D1.6	204 (58.12%)	75 (21.37%)	46 (13.11%)	16 (4.56%)	10 (2.85%)	0 (0%)
D2.1	78 (22.22%)	53 (15.1%)	91 (25.93%)	73 (20.8%)	54 (15.38%)	2 (0.57%)
D2.2	88 (25.07%)	84 (23.93%)	96 (27.35%)	62 (17.66%)	20 (5.7%)	1 (0.28%)
D2.3	145 (41.31%)	98 (27.92%)	70 (19.94%)	29 (8.26%)	8 (2.28%)	1 (0.28%)
D2.4	110 (31.34%)	66 (18.8%)	90 (25.64%)	65 (18.52%)	19 (5.41%)	1 (0.28%)
D2.5	68 (19.37%)	57 (16.24%)	57 (16.24%)	71 (20.23%)	95 (27.07%)	3 (0.85%)
D3.1	175 (49.86%)	58 (16.52%)	74 (21.08%)	28 (7.98%)	14 (3.99%)	2 (0.57%)
D3.2	165 (47.01%)	82 (23.36%)	67 (19.09%)	27 (7.69%)	9 (2.56%)	1 (0.28%)
D3.3	226 (64.39%)	56 (15.95%)	36 (10.26%)	25 (7.12%)	5 (1.42%)	3 (0.85%)
D3.4	123 (35.04%)	29 (8.26%)	39 (11.11%)	23 (6.55%)	18 (5.13%)	119 (33.9%)
D4.1	184 (52.42%)	73 (20.8%)	58 (16.52%)	25 (7.12%)	7 (1.99%)	4 (1.14%)
D4.2	208 (59.26%)	54 (15.38%)	44 (12.54%)	31 (8.83%)	12 (3.42%)	2 (0.57%)
D4.3	209 (59.54%)	65 (18.52%)	46 (13.11%)	22 (6.27%)	7 (1.99%)	2 (0.57%)
D4.4	161 (45.87%)	48 (13.68%)	56 (15.95%)	35 (9.97%)	26 (7.41%)	25 (7.12%)
D4.5	103 (29.34%)	46 (13.11%)	61 (17.38%)	41 (11.68%)	48 (13.68%)	52 (14.81%)
D5.1	- (-)	-	- (-)	-	- (-)	- (-)
D5.2	- (-)	-	- (-)	-	- (-)	- (-)
D5.3	64 (18.23%)	68 (19.37%)	95 (27.07%)	81 (23.08%)	39 (11.11%)	4 (1.14%)
D5.4	40 (11.4%)	62 (17.66%)	99 (28.21%)	85 (24.22%)	60 (17.09%)	5 (1.42%)
D5.5	21 (5.98%)	42 (11.97%)	65 (18.52%)	45 (12.82%)	24 (6.84%)	154 (43.87%)
D5.6	38 (10.83%)	36 (10.26%)	61 (17.38%)	44 (12.54%)	19 (5.41%)	153 (43.59%)
D5.7	35 (9.97%)	43 (12.25%)	60 (17.09%)	37 (10.54%)	23 (6.55%)	153 (43.59%)
D5.8	23 (6.55%)	30 (8.55%)	68 (19.37%)	45 (12.82%)	32 (9.12%)	153 (43.59%)
D6.1	103 (29.34%)	61 (17.38%)	69 (19.66%)	64 (18.23%)	43 (12.25%)	11 (3.13%)
D6.2	128 (36.47%)	81 (23.08%)	61 (17.38%)	51 (14.53%)	27 (7.69%)	3 (0.85%)
D6.3	141 (40.17%)	78 (22.22%)	53 (15.1%)	52 (14.81%)	26 (7.41%)	1 (0.28%)
D6.4	24 (6.84%)	51 (14.53%)	97 (27.64%)	130 (37.04%)	49 (13.96%)	0 (0%)
D6.5	16 (4.56%)	36 (10.26%)	63 (17.95%)	133 (37.89%)	102 (29.06%)	1 (0.28%)
D6.6	33 (9.4%)	71 (20.23%)	102 (29.06%)	107 (30.48%)	36 (10.26%)	2 (0.57%)
D6.7	36 (10.26%)	75 (21.37%)	83 (23.65%)	109 (31.05%)	40 (11.4%)	8 (2.28%)
D6.8	81 (23.08%)	70 (19.94%)	89 (25.36%)	70 (19.94%)	37 (10.54%)	4 (1.14%)

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