

Additional file 7. Comparison of HEIRO with LOINC and SNOMED CT

This file provides a detailed comparison of the proposed ontology, HEIRO (Health Examination Item Recommendation Ontology), with LOINC and SNOMED CT. HEIRO is a domain-specific ontology designed to support personalized health examination decision-making by structuring health-related information, guiding decision processes, and facilitating data representation and transmission.

The file includes a comprehensive table listing the classes (C), object properties (OP), and data properties (DP) of HEIRO, along with their definitions and corresponding terms in LOINC and SNOMED CT. Each term is marked with " ✓ " if it overlaps with an existing concept in LOINC or SNOMED CT and "×" if it does not. The table provides detailed explanations of similarities and differences, highlighting how HEIRO introduces novel elements to enhance decision-making in health examinations.

Table 1 Comparison of HEIRO with LOINC and SNOMED CT: Class and Property Mapping with Definitions and Differences

Attribute name	Type	Description	LOINC		SNOMED CT	
			Y/N	Details	Y/N	Details
Health Examination Item	C	Items to evaluate overall health	x	-	x	-
Physique Examination	C	Body-related indicators (height, weight)	√	Physical exam	√	Physical examination
Laboratory Examination	C	Blood, urine, or other sample tests	√	Laboratory	√	Laboratory test
Instrument Examination	C	CT, MRI, or other device examinations	x	Instances are distributed in subclasses of the Clinical class	x	Instances are distributed in subclasses of the Procedure class
Health Feature	C	Features of participants	x	-	x	-
Demography	C	Personal demographic information, including 6 subclasses: Age, Martial, Education, Profession, Address	√	Patient demographics panel	√	Demographic history
Health History	C	Personal and family medical conditions, including 8 subclasses: Medical History, Family History, Allergies History, Medication History, Surgery History, Menstrual History, Obstetric History, Sex Life	x	Instances are distributed in subclasses of the component	√	Situation with explicit context
Physical Symptom	C	Current physical discomfort, including 11 aspects: Head, Eye, Ear, Nose, Pharynx, Chest, Abdomen, Limb, Urinary, Temperature, Weight	x	-	x	Instances are distributed in subclasses of the Clinical finding class

Lifestyle	C	Daily habits including 4 subclasses: Diet, Smoking, Drinking, Exercise	x	Only smoking-related classes in the subclasses of Clinical class	√	Health-related behavior finding is the same as the Lifestyle we defined, but Diet is in the Dietary finding class
Environmental Health	C	Living and working environments, including 4 subclasses: Air Pollution, Chemical Pollution, Sound Pollution, Ionizing radiation	x	Instances are distributed in subclasses of the Clinical class	√	Environmental pollution
Mental Health	C	Psychological well-being, including 3 subclasses: Pressure, Anxiety, Depression	√	Mental health H&P note	√	Emotional state finding
Sleep Health	C	Quality and issues related to sleep	√	Sleep med H&P note	√	Finding related to ability to sleep
Health Literacy	C	Individual's ability to obtain and apply health-related supports, including 3 subclasses: Health Examination, Self-monitoring, Self-feeling	x	Distributed in subclasses of the component	√	Health literacy
Other Demand	C	Additional health needs beyond routine examinations	x	-	x	-
Taboo	C	Items to avoid, food, medications, or behaviors, etc. to avoid before the exam	x	-	x	-
hasItem	OP	Subclass of health examination items	x	-	x	-
hasFeature	OP	Subclass of health features	x	-	x	-
hasRecommendation	OP	Specific health features require specific health examination items	x	-	x	-

hasName	DP	Name of health examination items	x	-	√	has product name
hasDefinition	DP	Description of health examination items	x	-	√	has definitional manifestation
hasCategory	DP	Categories of health examination item; Categories of health history; Location of physical symptom; Categories of lifestyle; Categories of environmental health; Categories of mental health; Categories of health literacy	x	-	x	-
hasGender	DP	Gender classification of health examination items; Gender classification of demography; Gender classification of sex life	x	-	x	-
hasPrice	DP	Price of health examination items	x	-	x	-
hasValue	DP	Description of health features	x	-	√	has value
hasAge	DP	Age of demography	x	-	x	-
hasMarital	DP	Martial of demography	x	-	x	-
hasEducation	DP	Education of demography	x	-	x	-
hasProfession	DP	Profession of demography	x	-	x	-
hasAddress	DP	Address of demography	x	-	x	-
hasType	DP	Type of medication; Surgical site; Type of diet; Type of drinking; Type of exercise	x	Contains this DP but with a different meaning	x	-

hasYear	DP	Years of illness; Years of medication; Years of smoking and quitting smoking; Years of drinking and quitting drinking	x	-	x	-
hasFrequency	DP	Frequency of physical symptoms; Frequency of eating a certain food; Frequency of drinking a certain drink; Frequency of a certain exercise; Frequency of a certain mental condition; Frequency of health examination; Frequency of self-monitoring	x	-	x	-
hasNumber	DP	Smoking consumption; Alcohol consumption	x	Contains this DP but with a different meaning	x	-
hasDegree	DP	Degree of self-feeling health	x	-	x	-