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Health Transition in Indonesia: Disease Burden,Risk Factors,and UHC progress (1990-2016)- emphasizes epidemiological changes and health systems reforms

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Introduction And Background;

Indonesia is the world's fourth most populous nation, composed of more than 17,000 islands stretching across a vast archipelago. Its geography creates major differences in access to transportation, infrastructure, healthcare availability, and economic development. Because of these differences, health outcomes vary significantly across Indonesia's 34 provinces. The decades from 1990 to 2019 were a period of important transformation for Indonesia's health system. They saw decentralization of government functions, an increase in urbanization, expansion of health insurance coverage, and major epidemiological transitions.

The shift toward decentralization—delegating responsibilities from the central government to provincial and district governments—was intended to make healthcare more responsive to local needs. However, it also introduced uneven implementation due to varying administrative capacity. The introduction of Jaminan Kesehatan Nasional (JKN) in 2014 aimed to achieve universal health coverage and provide financial protection for citizens. By 2019, more than 80% of Indonesians had some form of insurance coverage, although the quality of care remained inconsistent across regions.

Indonesia's health profile is shaped by several long-standing challenges: infectious diseases such as tuberculosis, diarrheal diseases, neonatal disorders, and lower respiratory infections; high maternal and child mortality in poorer provinces; and rising non-communicable diseases (NCDs) such as hypertension, diabetes, stroke, and heart disease. The combined pressures of communicable and non-communicable diseases create a double burden, especially in underserved provinces.

National averages often give the impression of steady progress, but they mask large subnational disparities. For example, Java and Bali enjoy some of the highest levels of life expectancy in Southeast Asia, while provinces such as Papua, West Papua, and East Nusa Tenggara (NTT) continue to experience high levels of preventable mortality. Therefore, a detailed provincial analysis is essential for understanding Indonesia's overall health trajectory.

Methods And Data Sources;

The findings in this overview are based on the Global Burden of Disease (GBD) Study 2019, one of the most comprehensive epidemiological frameworks available. The GBD uses advanced statistical modelling to estimate health outcomes for countries, provinces, and territories worldwide.

1. Diseases and Risk Factors Covered

- 286 causes of death
- 369 non-fatal diseases and

injuries 87 risk factors, such as:

- Behavioral risks: tobacco, diet, alcohol

2. Health Outcome Metrics

Key metrics measured:

- Life expectancy (LE)
- Healthy life expectancy (HALE)
- Years of life lost (YLL) due to premature mortality
- Years lived with disability (YLD)
- Disability-adjusted life years (DALYs) = YLL + YLD
- These indicators allow comparisons across time, between sexes, and among provinces.

3. Data Sources

GBD integrates data from;

- Indonesia Sample Registration System (SRS)
- Verbal autopsy studies
- National Health Surveys
- Household socioeconomic surveys
- Hospital medical records
- Epidemiological studies
- Census data

4. Statistical Modelling

Advanced models ensure accuracy when local data are incomplete:

- CODEm (Cause of Death Ensemble Modelling) estimates cause-specific mortality.
- DisMod-MR 2.0 estimates incidence, prevalence, remission, and fatality for non-fatal conditions.
- Spatiotemporal regression models fill gaps for underreported provinces.
- Socio-Demographic Index(SDI) is used to interpret health outcomes relative to education, income, and fertility rates.

Life Expectancy (LE) And Healthy Life Expectancy (HALE);

1. National Trends (1990–2019)

- Indonesia experienced substantial improvements:
- Male life expectancy: 62.5 → 69.4 years
- Female life expectancy: 65.7 → 73.5 years
- HALE improved by approximately 6 years for both men and women.

These gains reflect better childhood survival, improved maternal care, expanded immunization, greater access to health services, and declining infectious diseases.

2. Provincial Variation

Highest Life Expectancy (2019)

- Men: Bali – 74.4 years
- Women: North Kalimantan – 77.7

years Gap:

- Male gap: ~10 years
- Female gap: ~14 years

This reflects stark differences in socioeconomic development, accessibility of health services, and burden of disease.

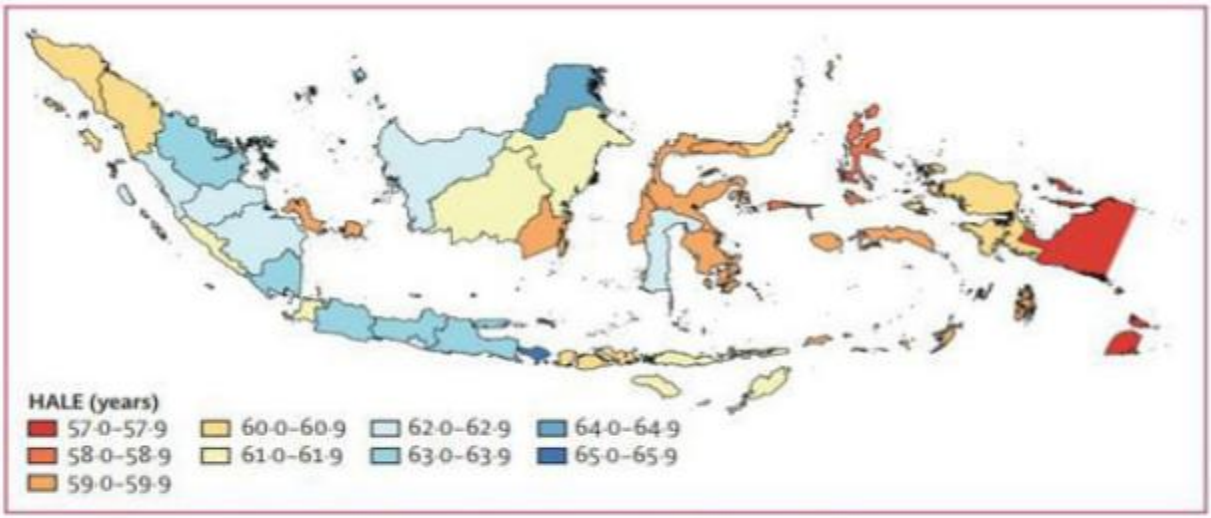


Figure 1: **Map of variations in HALE by province for male an female sexes, 2019**
HALE=healthy life expectancy.

3. Drivers of Improved Life Expectancy

- Reduction in child mortality
- Increased access to maternal health services
- Decline in infectious diseases
- Rising incomes and education levels
- Better access to clean water and sanitation

4. Reasons for Persisting Inequalities

- Infrastructure gaps in remote provinces
- Difficult geographic terrain
- Limited availability of healthcare

	Life expectancy at birth				Healthy life expectancy at birth			
	1990		2019		1990		2019	
	Estimate (95% UI)	Rank	Estimate (95% UI)	Rank	Estimate (95% UI)	Rank	Estimate (95% UI)	Rank
Indonesia	62·5 (61·3–63·7)	–	69·4 (67·2–71·6)	–	55·5 (53·3–57·7)	–	61·2 (58·5–63·9)	–
Bali	65·5 (63·5–67·8)	4	74·4 (70·9–77·9)	1	56·7 (54·1–59·3)	6	64·0 (60·5–67·4)	1
Riau Islands	63·6 (61·3–66·4)	9	72·7 (69·7–76·2)	2	55·9 (53·3–58·7)	12	63·9 (60·8–67·3)	2
North Kalimantan	65·3 (62·4–68·3)	6	72·0 (68·5–75·8)	3	58·0 (54·9–61·0)	4	63·5 (60·0–67·0)	3
Jakarta	68·2 (66·0–70·5)	2	71·2 (68·2–74·4)	4	59·0 (56·2–61·8)	1	62·2 (59·1–65·4)	6
Central Java	66·3 (64·2–68·4)	3	71·0 (68·4–74·0)	5	58·0 (55·7–60·5)	3	62·2 (59·3–65·3)	7
Yogyakarta	68·9 (66·7–71·1)	1	70·7 (67·7–74·0)	6	58·7 (56·2–61·3)	2	61·6 (58·5–64·8)	13
Lampung	62·5 (60·4–64·7)	14	70·6 (67·4–74·1)	7	55·4 (52·8–58·1)	16	62·5 (59·4–65·8)	5
West Papua	65·5 (62·9–68·5)	5	70·6 (67·2–74·1)	8	57·4 (54·6–60·4)	5	62·1 (58·9–65·6)	9
West Java	62·2 (60·3–64·2)	15	70·5 (67·6–73·6)	9	55·7 (53·2–58·2)	14	62·2 (59·1–65·4)	8
Gorontalo	62·0 (59·6–64·5)	17	70·4 (66·9–74·1)	10	56·2 (53·6–59·2)	10	63·1 (59·7–66·6)	4
Riau	63·2 (61·1–65·3)	12	70·4 (67·2–73·8)	11	56·2 (53·6–58·8)	11	61·9 (58·7–65·1)	11
South Sumatra	63·5 (61·3–65·9)	10	70·2 (67·0–73·4)	12	56·4 (53·9–59·2)	7	62·1 (58·8–65·3)	10
West Kalimantan	61·0 (58·7–63·3)	25	70·0 (66·9–73·3)	13	54·4 (51·3–57·0)	24	61·4 (58·2–64·6)	14
Jambi	61·3 (59·0–63·6)	23	69·7 (66·8–72·9)	14	54·2 (51·6–56·7)	26	61·4 (58·2–64·5)	15
South Sulawesi	61·3 (59·0–63·7)	22	69·5 (66·6–72·6)	15	54·6 (52·0–57·4)	23	61·3 (58·0–64·4)	17
North Maluku	59·0 (56·4–61·9)	29	69·4 (65·9–72·9)	16	53·5 (50·7–56·4)	29	61·9 (58·5–65·5)	12
East Java	62·0 (60·1–63·9)	16	69·3 (66·5–72·3)	17	55·0 (52·5–57·3)	19	61·0 (58·0–64·0)	19
Bengkulu	61·4 (59·2–63·8)	21	69·3 (66·1–72·6)	18	55·2 (52·5–57·8)	17	61·3 (58·0–64·5)	16
Central Kalimantan	63·3 (61·0–65·7)	11	68·9 (66·0–72·1)	19	55·9 (53·4–58·7)	13	61·0 (58·0–64·2)	18
East Nusa Tenggara	59·2 (57·1–61·4)	27	68·7 (65·5–72·1)	20	53·6 (50·9–56·1)	28	60·9 (57·7–64·2)	20
West Sumatra	62·0 (59·8–64·4)	18	68·6 (65·7–72·0)	21	55·2 (52·9–57·7)	18	60·4 (57·2–63·7)	25
Aceh	64·2 (61·7–66·6)	7	68·6 (65·2–72·0)	22	56·4 (53·7–59·1)	8	60·0 (56·5–63·2)	28
Banten	59·1 (56·7–61·5)	28	68·5 (65·4–71·9)	23	54·2 (51·5–56·8)	25	60·9 (57·6–64·0)	21
East Kalimantan	64·2 (62·1–66·5)	8	68·4 (64·8–71·8)	24	56·3 (53·8–58·8)	9	59·9 (56·6–63·2)	30
North Sulawesi	62·9 (60·7–65·2)	13	68·3 (65·2–71·5)	25	54·9 (52·3–57·5)	20	60·6 (57·2–63·9)	22
West Nusa Tenggara	56·1 (53·8–58·5)	33	68·1 (64·6–71·5)	26	52·2 (49·6–54·7)	33	60·6 (57·3–64·0)	23
Central Sulawesi	57·8 (55·7–60·2)	30	67·5 (64·0–71·2)	27	52·4 (49·9–54·9)	31	60·3 (56·8–63·7)	26
Maluku	57·5 (55·0–60·3)	31	67·2 (63·7–71·1)	28	53·2 (50·4–56·0)	30	60·2 (56·8–63·6)	27
West Sulawesi	55·1 (52·9–57·7)	34	67·2 (63·7–70·7)	29	51·2 (48·7–53·8)	34	60·5 (57·1–64·0)	24
Southeast Sulawesi	61·9 (59·5–64·2)	19	67·1 (63·8–70·7)	30	55·5 (52·8–58·3)	15	59·9 (56·6–63·3)	29
Bangka-Belitung Islands	60·3 (57·8–62·9)	26	67·0 (63·6–70·5)	31	54·1 (51·5–56·8)	27	59·5 (56·1–62·9)	31
North Sumatra	61·6 (59·4–63·8)	20	66·3 (62·8–69·7)	32	54·8 (52·3–57·2)	22	59·3 (56·0–62·5)	32
South Kalimantan	56·4 (54·2–58·6)	32	65·4 (61·9–68·9)	33	52·2 (49·8–54·6)	32	58·6 (55·0–61·8)	33
Papua	61·2 (58·9–64·0)	24	64·5 (60·9–68·2)	34	54·9 (52·3–57·7)	21	58·3 (54·9–61·9)	34

UI=uncertainty interval.

Table 1: **Male life expectancy and healthy life expectancy at birth for Indonesia and its provinces, 1990 and 2019**

Years Of Life Lost (YLL): Premature Mortality;

YLL quantifies deaths occurring earlier than the standard life expectancy.

1. Leading Causes of YLL in Indonesia (2019)

- Stroke
- Ischemic heart disease
- Neonatal disorders
- Tuberculosis (TB)
- Diabetes mellitus
- 6. Diarrheal diseases
- 7. Lower respiratory infections

2. Interpretation

- Stroke and heart disease dominate nationwide due to metabolic risks such as hypertension, high blood sugar, and obesity.
- Neonatal disorders remain high where maternal care is lacking.
- TB continues to burden provinces with crowded living conditions and limited healthcare access.
- Diarrheal diseases reflect sanitation gaps, especially in poor and rural areas.

3. Provincial Differences

- Wealthier provinces have fewer YLL from infectious diseases but more from chronic NCDs.
- Poorer provinces show the opposite pattern, reflecting a lag in the epidemiological transition.
- Aceh was the only province where YLL increased between 1990 and 2019, possibly linked to post-conflict and disaster-related disruptions.
-

Years Lived With Disability (YLD): Chronic Disease Burden;

YLD represents non-fatal health losses that reduce quality of life.

1. Top Contributors to YLD (2019):

- Low back pain
- Diabetes and diabetic complications
- Chronic respiratory diseases (COPD)
- Depressive disorders
- Anxiety disorders
- Osteoarthritis

2. Interpretation:

- As Indonesia's population ages, chronic diseases contribute more to long-term disability.
- Urbanisation brings sedentary lifestyles, pollution exposure, and diet transitions.
- Mental health disorders are becoming more visible but are still underdiagnosed

	Stroke	Ischaemic	Neonatal d	Diabetes	Tuberculo	Cirrhosis a chronic liv	Diarrhoeal	Lower resp infections	Chronic ob pulmonary	Road injuri	Congenital	Chronic kid	Hypertensi heart disea	Tracheal, b and lung c	Breast can	Asthma	Colon and	Dengue	Falls	Alzheimer other dem
Indonesia	3582	2735	1837	1224	1040	1107	980	812	756	696	661	537	539	551	346	321	344	280	240	242
Aceh	4260	2841	2046	1445	1136	1167	1111	975	852	835	699	609	634	608	432	391	386	30	298	232
Bali	2737	2005	230	1046	568	884	551	323	654	517	204	481	429	463	356	258	301	134	227	243
Bangka-Belitung Islands	5054	3465	2123	1772	1365	1530	1144	948	945	1027	774	734	663	657	468	454	439	34	327	229
Banten	3946	2956	2009	1411	1176	1116	1119	848	749	672	738	534	607	565	332	352	347	400	280	232
Bengkulu	4230	2831	2096	1555	1079	1214	987	840	863	890	661	593	620	545	446	393	329	75	240	231
Gorontalo	4398	2078	2904	1457	2692	1445	1829	1642	952	781	1025	979	682	530	682	519	331	37	242	232
Jakarta	2920	2841	1375	1364	808	801	767	645	620	509	531	438	453	632	304	228	483	155	220	225
Jambi	4283	2688	1772	1245	1101	833	978	873	780	766	612	588	608	573	342	339	361	38	361	232
West Java	3342	3031	1792	1079	1154	937	882	708	721	525	632	448	512	531	273	284	313	323	178	228
Central Java	3755	2413	1212	986	874	1043	781	615	645	574	529	556	504	497	327	250	294	209	196	248
East Java	3298	2614	1633	1104	843	1224	967	685	695	678	579	485	480	554	336	274	345	280	238	251
West Kalimantan	3901	2581	1406	1329	969	1123	881	674	815	659	512	521	569	521	386	360	315	1481	259	230
South Kalimantan	3260	4294	2501	1755	1529	1400	1227	1301	928	1230	739	776	986	639	321	482	416	277	262	237
Central Kalimantan	2068	4665	1811	1893	1091	1155	1013	649	713	655	612	604	640	572	308	276	357	265	205	227
East Kalimantan	4699	2667	1321	1343	1025	1247	638	744	797	851	556	643	569	782	352	351	648	243	277	209
North Kalimantan	1251	1528	2362	1819	274	705	404	793	1142	496	905	515	206	520	103	323	359	415	186	201
Riau Islands	3473	2337	1594	1168	770	926	862	709	663	425	573	474	539	597	330	283	413	462	223	217
Lampung	3730	2072	2122	1162	858	980	1001	855	742	648	720	483	509	507	279	314	288	67	256	232
Maluku	4709	2990	2470	1616	2351	1236	2169	1229	923	778	835	702	551	498	987	506	302	169	267	215
North Maluku	5109	3262	2806	2082	2558	1485	1639	1550	954	328	906	751	770	553	589	610	313	185	313	221
West Nusa Tenggara	3752	2713	2147	1316	1392	1446	1292	1001	975	889	762	589	736	593	454	487	346	535	346	247
East Nusa Tenggara	3645	2375	2300	1315	1424	1341	1233	1091	1024	707	795	605	637	486	484	461	284	41	306	271
Papua	4875	3169	3426	1804	1760	1676	1964	1448	1080	1267	1253	818	710	733	561	584	483	159	413	222
West Papua	4097	3240	2017	2217	1437	1237	816	1033	876	772	732	845	665	674	549	423	457	149	268	223
Riau	3648	2464	1369	1255	803	919	926	697	750	812	600	481	490	655	284	299	450	193	231	227
West Sulawesi	4743	3081	2861	1844	1359	1485	1625	1315	1027	910	986	731	713	564	634	531	342	649	345	234
South Sulawesi	3323	2551	1600	1249	1060	1175	899	836	986	851	582	546	579	543	375	397	341	231	285	261
Central Sulawesi	4235	2998	2487	1699	1272	1167	1261	1757	1063	760	838	667	655	569	563	520	356	597	287	203
Southeast Sulawesi	4614	3075	2639	2159	1501	1438	1418	1325	985	518	925	574	710	571	439	598	358	258	348	216
North Sulawesi	4238	2494	2047	1664	1173	1270	1146	951	865	989	897	643	587	609	488	397	390	153	383	238
West Sumatra	3406	2821	1422	1228	1096	1169	871	713	923	907	571	672	638	609	334	399	390	39	224	252
South Sumatra	3326	2940	2210	1138	896	832	913	908	696	678	733	520	533	546	299	290	340	229	220	240
North Sumatra	3968	3014	2542	1784	1033	1344	1150	1014	952	1067	814	636	585	618	363	396	404	433	296	254
Yogyakarta	3927	2506	1098	1195	894	1082	716	607	733	739	452	518	553	526	383	304	333	266	239	232

Significantly lower than national mean Significantly higher than national mean

Disability-Adjusted Life Years (DALYs);

DALYs combine YLL and YLD, giving a complete picture of health loss.

1. Indonesia's Epidemiological Transition:

- Infectious diseases have declined but not disappeared.
- NCDs have risen sharply due to lifestyle and metabolic risks.
- Maternal and neonatal disorders persist in poor provinces.

2. Double Burden of Disease Indonesia faces:

- Persistent infectious diseases: TB, diarrhea, pneumonia, neonatal conditions.
- Rapidly growing NCDs: stroke, heart disease, diabetes, cancers, chronic kidney disease.

This dual pressure strains health systems, requiring both long-term care and infectious disease management.

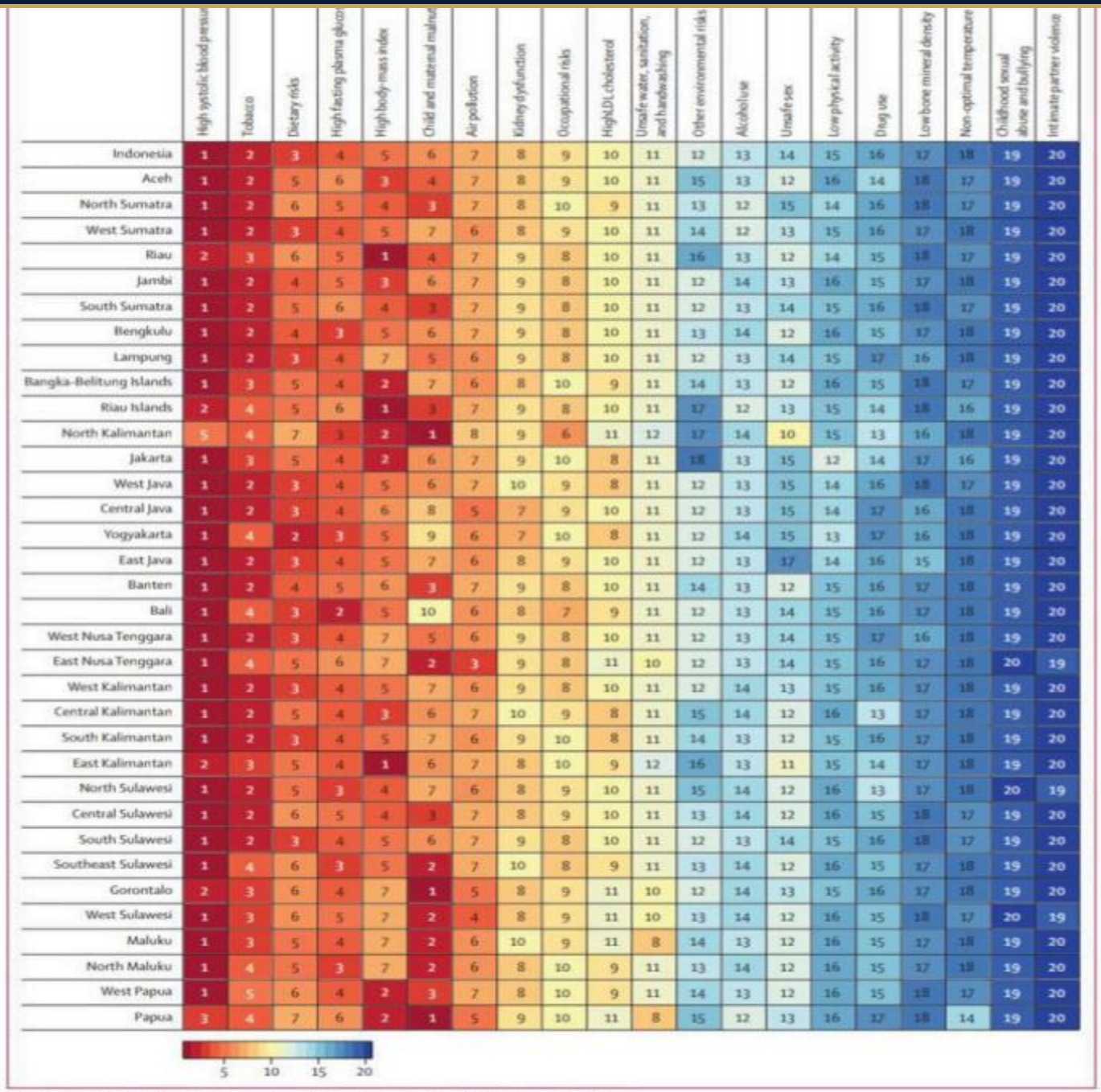


Figure 3: **Leading risk factors for disability-adjusted life-years (DALYs) by province, 2019**

Risk Factors Contributing To Disease Burden;

1. Top Six Risk Factors (2019):

- High systolic blood pressure
- Tobacco use
- Poor dietary habits
- High fasting plasma glucose
- High BMI
- Child and maternal malnutrition

2. Geographic Patterns:

- Eastern provinces: High malnutrition, poor maternal care, high infectious disease burden.
- Urban provinces: High prevalence of hypertension, diabetes, obesity, and dietary risks.
- Tobacco use: Extremely high among men nationwide (over 60%).

3. Underlying Causes:

- Rapid economic change
- Transition from traditional diets to processed foods
- Sedentary lifestyles
- Health system limitations in early detection and management

Provincial Inequalities In Health;

1.High-performing Provinces:

- Jakarta
- Bali
- Yogyakarta
- Central Java

These provinces share characteristics such as:

- Higher income
- Better education
- Stronger health infrastructure
- Better

2.Low-performing Provinces:

- Papua
- West Papua
- Maluku
- NTT
- North Maluku

These provinces suffer from:

- Geographic isolation
- Limited hospitals and skilled workers
- High maternal and infant mortality
- High rates of stunting
- Poor transportation networks

3.Consequences of Inequality:

- Unequal access to healthcare services
- Uneven distribution of health professionals
- Differences in exposure to risk factors
- Higher burden of preventable deaths in poor provinces.

The Double Burden Of Disease: A Critical Challenge;

1.Communicable Diseases:

Despite progress, diseases like:

- TB
- Diarrhea
- Lower respiratory infections
- Malaria (in limited regions) remain significant challenges

2.Non-Communicable Diseases:

- NCDs are now the leading causes of death:
- Stroke
- Ischemic heart disease
- Diabetes
- Chronic kidney disease
- Cancers.

3.Why Both Burdens Persist:

- Uneven development
- Differences in poverty levels

- Limited chronic disease management programs

1.Strengthen Primary Health Care:

- Improve chronic disease detection (diabetes, hypertension)
- Expand NCD screening at Puskesmas
- Increase availability of essential medications

2.Enhance Maternal and Child Health:

- Increase number of trained midwives
- Ensure emergency obstetric care
- Expand newborn screening programs

3.Invest in Nutrition Programs:

- Reduce stunting in eastern provinces
- School feeding programs
- Improve maternal nutrition

4.Strengthen Infectious Disease Control:

- Accelerate TB screening
- Expand vaccination
- Improve sanitation

5.Reduce Regional Inequities:

- Allocate more resources to remote provinces
- Incentivize health workers to serve in rural areas

Conclusion;

From 1990 to 2025, Indonesia experienced significant improvements in life expectancy and reductions in infectious diseases. However, these gains have been uneven, with large health inequalities persisting between provinces. The rise of non-communicable diseases, combined with continued infectious disease challenges,
creates a complex national health landscape.

Provincial-level analysis reveals clear priorities: strengthened primary care, improved nutrition, enhanced maternal and child health services, and targeted interventions in underserved regions. Using high- quality data such as the GBD 2019 study will enable Indonesia to design province-specific strategies that
reduce inequalities, address its double burden of disease, and progress toward universal, equitable health for all.

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