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Barriers, limitations, and challenges to the implementation of artificial intelligence in Latin American healthcare systems: a scoping review

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Online Resource 6. Supplementary analyses: regional specificity, AI-specific sensitivity analysis, claim provenance and citation concentration, and per-source evidence profile

All counts are computed by script from the deposited charting dataset (1,031 distinct verified barrier instances, 43 sources). Each table names its denominator. The regional specificity groups are defined in the Methods and in Online Resource 4 (B1), and every source coding was verified.

Table S6.1. Sources, instances and evidence basis by regional specificity group and by cumulative set.

Set	Sources (n)	Instances (n)	Empirically studied, n (%)	Asserted (n)	Asserted (%)
Exclusive	16	370	86 (23.2)	284	76.8
Separate arm	17	400	97 (24.2)	303	75.8
Group	10	261	145 (55.6)	116	44.4
Cumulative: exclusive	16	370	86 (23.2)	284	76.8
Cumulative: exclusive + separate arm	33	770	183 (23.8)	587	76.2
Cumulative: all sources	43	1031	328 (31.8)	703	68.2

Exclusive: exclusively Latin American material. Separate arm: a separately attributable Latin American arm, case or table row inside wider material. Group: Latin American settings only inside pooled multinational results.

Table S6.2. Distribution of instances by level of analysis and by thematic domain in each cumulative set (% of the set), with the shift between the exclusively regional set and the full corpus (percentage points).

Variable	Value	Exclusive (%)	Exclusive + separate arm	All sources	Shift, exclusive

			(%)	(%)	minus all
level	health-system	41.9	38.3	36.3	5.6
level	regulatory/political	20.3	20.8	21.0	-0.7
level	institutional	17.3	19.0	19.3	-2.0
level	professional	11.9	12.7	13.0	-1.1
level	patient	8.6	9.2	10.4	-1.8
domain	operational	14.3	19.4	18.3	-4.0
domain	regulatory	13.8	16.6	17.3	-3.5
domain	infrastructural	18.9	18.2	17.1	1.8
domain	organisational	21.9	13.8	14.5	7.4
domain	ethical	9.5	14.5	14.2	-4.7
domain	sociocultural	15.4	11.7	12.3	3.1
domain	financial	6.2	5.8	6.3	-0.1

Table S6.3. Level by domain cross-tabulation for each cumulative set (n, % of the set).

Set	Level	Domain	n	% of set
A	health-system	ethical	13	3.5
A	health-system	financial	16	4.3
A	health-system	infrastructural	59	15.9
A	health-system	operational	19	5.1
A	health-system	organisational	33	8.9
A	health-system	regulatory	3	0.8
A	health-system	sociocultural	12	3.2
A	institutional	ethical	1	0.3
A	institutional	financial	4	1.1
A	institutional	infrastructural	6	1.6
A	institutional	operational	20	5.4
A	institutional	organisational	27	7.3

A	institutional	sociocultural	6	1.6
A	patient	ethical	6	1.6
A	patient	financial	1	0.3
A	patient	infrastructural	5	1.4
A	patient	operational	1	0.3
A	patient	sociocultural	19	5.1
A	professional	ethical	3	0.8
A	professional	operational	13	3.5
A	professional	organisational	9	2.4
A	professional	sociocultural	19	5.1
A	regulatory/political	ethical	12	3.2
A	regulatory/political	financial	2	0.5
A	regulatory/political	organisational	12	3.2
A	regulatory/political	regulatory	48	13.0
A	regulatory/political	sociocultural	1	0.3
A+B	health-system	ethical	31	4.0
A+B	health-system	financial	30	3.9
A+B	health-system	infrastructural	112	14.5
A+B	health-system	operational	53	6.9
A+B	health-system	organisational	42	5.5
A+B	health-system	regulatory	8	1.0
A+B	health-system	sociocultural	19	2.5
A+B	institutional	ethical	14	1.8
A+B	institutional	financial	11	1.4
A+B	institutional	infrastructural	20	2.6
A+B	institutional	operational	59	7.7
A+B	institutional	organisational	36	4.7

A+B	institutional	sociocultural	6	0.8
A+B	patient	ethical	29	3.8
A+B	patient	financial	1	0.1
A+B	patient	infrastructural	8	1.0
A+B	patient	operational	1	0.1
A+B	patient	sociocultural	32	4.2
A+B	professional	ethical	18	2.3
A+B	professional	operational	36	4.7
A+B	professional	organisational	12	1.6
A+B	professional	sociocultural	32	4.2
A+B	regulatory/political	ethical	20	2.6
A+B	regulatory/political	financial	3	0.4
A+B	regulatory/political	organisational	16	2.1
A+B	regulatory/political	regulatory	120	15.6
A+B	regulatory/political	sociocultural	1	0.1
A+B+C	health-system	ethical	37	3.6
A+B+C	health-system	financial	37	3.6
A+B+C	health-system	infrastructural	140	13.6
A+B+C	health-system	operational	69	6.7
A+B+C	health-system	organisational	56	5.4
A+B+C	health-system	regulatory	12	1.2
A+B+C	health-system	sociocultural	23	2.2
A+B+C	institutional	ethical	18	1.7
A+B+C	institutional	financial	18	1.7
A+B+C	institutional	infrastructural	26	2.5
A+B+C	institutional	operational	70	6.8
A+B+C	institutional	organisational	58	5.6

A+B+C	institutional	sociocultural	9	0.9
A+B+C	patient	ethical	42	4.1
A+B+C	patient	financial	3	0.3
A+B+C	patient	infrastructural	10	1.0
A+B+C	patient	operational	2	0.2
A+B+C	patient	sociocultural	50	4.8
A+B+C	professional	ethical	25	2.4
A+B+C	professional	operational	48	4.7
A+B+C	professional	organisational	16	1.6
A+B+C	professional	regulatory	1	0.1
A+B+C	professional	sociocultural	44	4.3
A+B+C	regulatory/political	ethical	24	2.3
A+B+C	regulatory/political	financial	7	0.7
A+B+C	regulatory/political	organisational	20	1.9
A+B+C	regulatory/political	regulatory	165	16.0
A+B+C	regulatory/political	sociocultural	1	0.1

Table S6.4. Sensitivity analysis restricted to AI-specific instances (instances coded ai_specific or both; n = 813 of 1,031, 78.9%, from 38 of 43 sources), against the full corpus.

Variable	Value	Full corpus, n	Full corpus, %	AI subset, n	AI subset, %	Shift (points)
evidence_type	asserted	703	68.2	515	63.3	-4.9
evidence_type	empirically studied	328	31.8	298	36.7	4.9
level	health-system	374	36.3	272	33.5	-2.8
level	regulatory/political	217	21.0	184	22.6	1.6
level	institutional	199	19.3	162	19.9	0.6
level	professional	134	13.0	119	14.6	1.6
level	patient	107	10.4	76	9.3	-1.1

domain	operational	189	18.3	162	19.9	1.6
domain	regulatory	178	17.3	152	18.7	1.4
domain	infrastructural	176	17.1	108	13.3	-3.8
domain	organisational	150	14.5	114	14.0	-0.5
domain	ethical	146	14.2	135	16.6	2.4
domain	sociocultural	127	12.3	93	11.4	-0.9
domain	financial	65	6.3	49	6.0	-0.3
sub_theme	governance/regulatory framework gap	146	14.2	126	15.5	1.3
sub_theme	data quality/availability	80	7.8	61	7.5	-0.3
sub_theme	equity/access	73	7.1	52	6.4	-0.7
sub_theme	connectivity/infrastructure gap	72	7.0	48	5.9	-1.1
sub_theme	digital literacy/workforce capacity gap	72	7.0	59	7.3	0.3
sub_theme	trust/acceptance	63	6.1	51	6.3	0.2
sub_theme	cost/procurement/funding scarcity	52	5.0	37	4.6	-0.4
sub_theme	data protection/privacy	51	4.9	41	5.0	0.1
sub_theme	poor interoperability	46	4.5	20	2.5	-2.0
sub_theme	workflow integration	44	4.3	32	3.9	-0.4
sub_theme	model validation/generalizability gap	37	3.6	36	4.4	0.8
sub_theme	liability/ethical risk	34	3.3	32	3.9	0.6
sub_theme	workforce shortage/multidisciplinary gap	32	3.1	27	3.3	0.2
sub_theme	algorithmic bias/fairness	27	2.6	26	3.2	0.6
sub_theme	clinical validation gap	22	2.1	20	2.5	0.4
sub_theme	explainability/black-box	22	2.1	22	2.7	0.6

sub_theme	change management/stakeholder engagement	21	2.0	15	1.8	-0.2
sub_theme	weak collaborative research networks	17	1.6	15	1.8	0.2
sub_theme	technological dependency/sovereignty	16	1.6	13	1.6	0.0
sub_theme	regulatory heterogeneity/harmonization gap	13	1.3	10	1.2	-0.1
sub_theme	technical performance/accuracy limitation	13	1.3	13	1.6	0.3
sub_theme	language/cultural adaptation gap	10	1.0	6	0.7	-0.3
sub_theme	adoption lag/slow uptake	8	0.8	6	0.7	-0.1
sub_theme	regional evidence-base under-representation	6	0.6	5	0.6	0.0
sub_theme	device/technology approval process	6	0.6	6	0.7	0.1
sub_theme	private-sector influence on governance	6	0.6	4	0.5	-0.1
sub_theme	unproven real-world benefit	6	0.6	5	0.6	0.0
sub_theme	conceptual/terminological imprecision	6	0.6	3	0.4	-0.2
sub_theme	bureaucratic/administrative barriers	5	0.5	2	0.2	-0.3
sub_theme	over-reliance/automation bias/deskilling	5	0.5	5	0.6	0.1
sub_theme	environmental/energy sustainability	4	0.4	4	0.5	0.1
sub_theme	workforce displacement/substitution	4	0.4	4	0.5	0.1
sub_theme	analytical/data-processing capacity gap	3	0.3	1	0.1	-0.2

sub_theme	innovation/R&D capacity gap	3	0.3	2	0.2	-0.1
sub_theme	research funding/agenda misallocation	2	0.2	2	0.2	0.0
sub_theme	data access/sharing restriction	1	0.1	0	0.0	-0.1
sub_theme	patient/public AI literacy gap	1	0.1	1	0.1	0.0
sub_theme	evidence transferability gap	1	0.1	0	0.0	-0.1
sub_theme	health-system fragmentation	1	0.1	1	0.1	0.0
claim_provenance	cited_external	397	38.5	295	36.3	-2.2
claim_provenance	primary	367	35.6	332	40.8	5.2
claim_provenance	unattributed	267	25.9	186	22.9	-3.0
barrier_status	experienced	755	73.2	565	69.5	-3.7
barrier_status	anticipated	275	26.7	247	30.4	3.7
barrier_status	both	1	0.1	1	0.1	0.0
latam_attributable	pooled_multiregion	331	32.1	283	34.8	2.7
latam_attributable	named_country	316	30.6	224	27.6	-3.0
latam_attributable	unspecified_setting	235	22.8	197	24.2	1.4
latam_attributable	regional	149	14.5	109	13.4	-1.1

Table S6.5. Claim provenance by study design group: instances whose claim is the source's own primary finding, cited from another publication (external), unattributed, or cited from another included source (internal); and the AI-specific share of each group.

Design group	Instances	Primary	Cited, external	Unattributed	Cited, internal	AI-specific instances	AI-specific (%)
document/legal analysis	163	65	62	36	0	129	79.1
perspective/opinion	17	0	9	8	0	17	100.0
primary empirical	317	227	52	38	0	291	91.8

review: narrative	269	16	121	132	0	186	69.1
review: systematic/scoping	265	59	153	53	0	190	71.7

Cited, internal is a lower bound: 224 of the 397 external citation markers are bare numerals that identify nothing outside their own source and were not resolved against the 43 reference lists; the other 173 were scanned for the first author of every included source and none matched (Online Resource 4, B1).

Table S6.6. Citation concentration: cited works that carry three or more barrier instances in one citing source, among the 397 instances cited from other publications. The marker is the citing source's own reference marker; a bare numeral identifies the work only within that source.

Citing source	Marker as printed	Instances carried	Bare numeral
Machado	a consultoria contratada pela SETEL/MCTI	6	NO
Alencar	[29]	4	YES
CiecierskiHolmes	15; Ugarte-Gil et al.	4	NO
VillamarinMarrugo	refs 19, 20	4	YES
Alencar	[17]	3	YES
ArcosHuaman	ref 5	3	YES
ArcosHuaman	ref 4	3	YES
Bellei	[61]; [62]	3	NO
CiecierskiHolmes	38; GIZ	3	NO
Fagundes	(29)	3	YES
Machado	(Brasil, 2021f), o diagnóstico da EBIA	3	NO
Marey	[9–11, 43]	3	NO
Valli	refs 46-50	3	YES
VasconezGonzalez	[22, 27]	3	YES
VasconezGonzalez	[27] Cargua et al.	3	NO
Vidal	(Sai et al., 2024)	3	NO
Vidal	Organización Mundial de la Salud (2021)	3	NO

Yepes	[4,15]	3	YES

Table S6.7. Per-source evidence profile: distinct barrier instances, instances empirically studied, design group and regional specificity, sorted by instance count.

Source	Design group	Regional specificity	Instances	Empirically studied	Studied (%)
Machado	document/legal analysis	Exclusive	66	31	47.0
MarcoRuiz	primary empirical	Group	46	41	89.1
Baka	primary empirical	Group	42	40	95.2
Dantas	primary empirical	Group	40	40	100.0
ZavaletaMonestel	document/legal analysis	Separate arm	40	28	70.0
Sussman	review: narrative	Separate arm	37	0	0.0
CiecierskiHolmes	review: systematic/scoping	Separate arm	32	9	28.1
Shahid	review: systematic/scoping	Separate arm	32	0	0.0
VillamarinMarrugo	review: systematic/scoping	Separate arm	32	23	71.9
SanchezGonzalez	primary empirical	Exclusive	31	11	35.5
Vidal	review: systematic/scoping	Group	30	2	6.7
Werutsky	review: narrative	Exclusive	30	0	0.0
deAndrade	review: narrative	Group	30	0	0.0
Bellei	review: systematic/scoping	Exclusive	28	8	28.6
Marey	primary empirical	Separate arm	27	7	25.9
Solari	review: narrative	Separate arm	26	0	0.0
GonzalesAste	review: narrative	Separate arm	25	0	0.0

VasconezGonzalez	review: narrative	Exclusive	25	0	0.0
Bentes	document/legal analysis	Separate arm	24	3	12.5
GarciaAlonso	review: narrative	Exclusive	24	0	0.0
McLennan	primary empirical	Group	24	19	79.2
ArcosHuaman	review: systematic/scoping	Separate arm	22	5	22.7
Silva	document/legal analysis	Exclusive	21	0	0.0
Yepes	review: narrative	Exclusive	21	0	0.0
Lemes	review: narrative	Exclusive	20	5	25.0
MendezAvila	primary empirical	Exclusive	20	12	60.0
Luna	primary empirical	Exclusive	18	4	22.2
Portilho	primary empirical	Exclusive	18	3	16.7
Soares	review: narrative	Separate arm	18	0	0.0
Alencar	review: systematic/scoping	Separate arm	17	7	41.2
Fagundes	review: systematic/scoping	Separate arm	17	2	11.8
Rocha	perspective/opinion	Separate arm	17	0	0.0
Valli	review: systematic/scoping	Group	17	2	11.8
ElizabethAlburuquequeArana	review: systematic/scoping	Group	16	0	0.0
Santa	primary empirical	Exclusive	16	1	6.2
PuigBosch	primary empirical	Separate arm	15	12	80.0
GarciaArias	primary empirical	Exclusive	14	8	57.1
Botero	review: systematic/scoping	Separate arm	13	0	0.0

Ribeiro	document/legal analysis	Exclusive	12	3	25.0
DeMoraisRodrigues	review: systematic/scoping	Group	9	1	11.1
XiquesMolina	review: narrative	Group	7	0	0.0
Chatterjee	review: narrative	Exclusive	6	0	0.0
MorenoFernandez	primary empirical	Separate arm	6	1	16.7