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Included files

TABLES

Table S1. The data of health indicators in China from 1991 to 2023.

Table S2. The RD and RR of health indicators in China from 1991 to 2023.

Table S3. Comparison of actual and predictive values for MMR, U5MR, IMR, NMR in 2023.

Table S4. Prediction errors of each health indicator under different ϵ values.

Table S5. The urban-rural disparities of health indicators from 2024 to 2030.

FIGURES

Figure S1. The results of residual analysis for MMR at the national, urban, and rural levels.

Figure S2. The results of residual analysis for U5MR at the national, urban, and rural levels.

Figure S3. The results of residual analysis for IMR at the national, urban, and rural levels.

Figure S4. The results of residual analysis for NMR at the national, urban, and rural levels.

Table S1. The data of health indicators in China from 1991 to 2023

Year	MMR (per 100,000)			U5MR (‰)			IMR (‰)			NMR (‰)		
	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural
1991	80.00	46.30	100.00	61.00	20.90	71.10	50.20	17.30	58.00	33.10	12.50	37.90
1992	76.50	42.70	97.90	57.40	20.70	65.60	46.70	18.40	53.20	32.50	13.90	36.80
1993	67.30	38.50	85.10	53.10	18.30	61.60	43.60	15.90	50.00	31.20	12.90	35.40
1994	64.80	44.10	77.50	49.60	18.00	56.90	39.90	15.50	45.60	28.50	12.20	32.30
1995	61.90	39.20	76.00	44.50	16.40	51.10	36.40	14.20	41.60	27.30	10.60	31.10
1996	63.90	29.20	86.40	45.00	16.90	51.40	36.00	14.80	40.90	24.00	12.20	26.70
1997	63.60	38.30	80.40	42.30	15.50	48.50	33.10	13.10	37.70	24.20	10.30	27.50
1998	56.20	28.60	74.10	42.00	16.20	47.90	33.20	13.50	37.70	22.30	10.00	25.10
1999	58.70	26.20	79.70	41.40	14.30	47.70	33.30	11.90	38.20	22.20	9.50	25.10
2000	53.00	29.30	69.60	39.70	13.80	45.70	32.20	11.80	37.00	22.80	9.50	25.80
2001	50.20	33.10	61.90	35.90	16.30	40.40	30.00	13.60	33.80	21.40	10.60	23.90
2002	43.20	22.30	58.20	34.90	14.60	39.60	29.20	12.20	33.10	20.70	9.70	23.20
2003	51.30	27.60	65.40	29.90	14.80	33.40	25.50	11.30	28.70	18.00	8.90	20.10
2004	48.30	26.10	63.00	25.00	12.00	28.50	21.50	10.10	24.50	15.40	8.40	17.30
2005	47.70	25.00	53.80	22.50	10.70	25.70	19.00	9.10	21.60	13.20	7.50	14.70
2006	41.10	24.80	45.50	20.60	9.60	23.60	17.20	8.00	19.70	12.00	6.80	13.40
2007	36.60	25.20	41.30	18.10	9.00	21.80	15.30	7.70	18.60	10.70	5.50	12.80
2008	34.20	29.20	36.10	18.50	7.90	22.70	14.90	6.50	18.40	10.20	5.00	12.30
2009	31.90	26.60	34.00	17.20	7.60	21.10	13.80	6.20	17.00	9.00	4.50	10.80
2010	30.00	29.70	30.10	16.40	7.30	20.10	13.10	5.80	16.10	8.30	4.10	10.00
2011	26.10	25.20	26.50	15.60	7.10	19.10	12.10	5.80	14.70	7.80	4.00	9.40
2012	24.50	22.20	25.60	13.20	5.90	16.20	10.30	5.20	12.40	6.90	3.90	8.10
2013	23.20	22.40	23.60	12.00	6.00	14.50	9.50	5.20	11.30	6.30	3.70	7.30
2014	21.70	20.50	22.20	11.70	5.90	14.20	8.90	4.80	10.70	5.90	3.50	6.90
2015	20.10	19.80	20.20	10.70	5.80	12.90	8.10	4.70	9.60	5.40	3.30	6.40
2016	19.90	19.50	20.00	10.20	5.20	12.40	7.50	4.20	9.00	4.90	2.90	5.70
2017	19.60	16.60	21.10	9.05	4.84	10.94	6.77	4.15	7.94	4.48	2.65	5.30
2018	18.30	15.50	19.90	8.40	4.40	10.20	6.10	3.60	7.30	3.90	2.20	4.70
2019	17.80	16.50	18.60	7.80	4.10	9.40	5.60	3.40	6.60	3.50	2.00	4.10
2020	16.90	14.10	18.50	7.50	4.40	8.90	5.40	3.60	6.20	3.40	2.10	3.90
2021	16.10	15.40	16.50	7.10	4.10	8.50	5.00	3.20	5.80	3.10	1.90	3.60
2022	15.70	14.30	16.60	6.80	4.20	8.00	4.90	3.10	5.70	3.10	1.80	3.60
2023	15.10	12.50	17.00	6.20	3.90	7.20	4.50	2.90	5.20	2.80	1.70	3.20

Abbreviations: MMR: maternal mortality ratio; U5MR: under-five mortality rate; IMR: infant mortality rate; NMR: neonatal mortality rate.

Table S2. The RD and RR of health indicators in China from 1991 to 2023

Year	MMR		U5MR		IMR		NMR	
	RD (per 100,000)	RR	RD (‰)	RR	RD (‰)	RR	RD (‰)	RR
1991	53.70	2.16	50.20	3.40	40.70	3.35	25.40	3.03
1992	55.20	2.29	44.90	3.17	34.80	2.89	22.90	2.65
1993	46.60	2.21	43.30	3.37	34.10	3.14	22.50	2.74
1994	33.40	1.76	38.90	3.16	30.10	2.94	20.10	2.65
1995	36.80	1.94	34.70	3.12	27.40	2.93	20.50	2.93
1996	57.20	2.96	34.50	3.04	26.10	2.76	14.50	2.19
1997	42.10	2.10	33.00	3.13	24.60	2.88	17.20	2.67
1998	45.50	2.59	31.70	2.96	24.20	2.79	15.10	2.51
1999	53.50	3.04	33.40	3.34	26.30	3.21	15.60	2.64
2000	40.30	2.38	31.90	3.31	25.20	3.14	16.30	2.72
2001	28.80	1.87	24.10	2.48	20.20	2.49	13.30	2.25
2002	35.90	2.61	25.00	2.71	20.90	2.71	13.50	2.39
2003	37.80	2.37	18.60	2.26	17.40	2.54	11.20	2.26
2004	36.90	2.41	16.50	2.38	14.40	2.43	8.90	2.06
2005	28.80	2.15	15.00	2.40	12.50	2.37	7.20	1.96
2006	20.70	1.83	14.00	2.46	11.70	2.46	6.60	1.97
2007	16.10	1.64	12.80	2.42	10.90	2.42	7.30	2.33
2008	6.90	1.24	14.80	2.87	11.90	2.83	7.30	2.46
2009	7.40	1.28	13.50	2.78	10.80	2.74	6.30	2.40
2010	0.40	1.01	12.80	2.75	10.30	2.78	5.90	2.44
2011	1.30	1.05	12.00	2.69	8.90	2.53	5.40	2.35
2012	3.40	1.15	10.30	2.75	7.20	2.38	4.20	2.08
2013	1.20	1.05	8.50	2.42	6.10	2.17	3.60	1.97
2014	1.70	1.08	8.30	2.41	5.90	2.23	3.40	1.97
2015	0.40	1.02	7.10	2.22	4.90	2.04	3.10	1.94
2016	0.50	1.03	7.20	2.38	4.80	2.14	2.80	1.97
2017	4.50	1.27	6.10	2.26	3.79	1.91	2.65	2.00
2018	4.40	1.28	5.80	2.32	3.70	2.03	2.50	2.14
2019	2.10	1.13	5.30	2.29	3.20	1.94	2.10	2.05
2020	4.40	1.31	4.50	2.02	2.60	1.72	1.80	1.86
2021	1.10	1.07	4.40	2.07	2.60	1.81	1.70	1.89
2022	2.30	1.16	3.80	1.90	2.60	1.84	1.80	2.00
2023	4.50	1.36	3.30	1.85	2.30	1.79	1.50	1.88

Abbreviations: MMR: maternal mortality ratio; U5MR: under-five mortality rate; IMR: infant mortality rate; NMR: neonatal mortality rate; RD: rate difference; RR: rate ratio.

Table S3. Comparison of actual and predictive values for MMR, U5MR, IMR, NMR in 2023

Indicators	Region	Actual	Predicted	95% CI	Difference (Actual-Predicted)
MMR (per 100,000)	National	15.10	13.63	(7.28, 19.97)	1.47
	Urban	12.50	12.91	(6.49, 19.33)	-0.41
	Rural	17.00	13.91	(4.43, 23.39)	3.09
U5MR (‰)	National	6.20	6.44	(3.40, 9.49)	-0.24
	Urban	3.90	3.45	(1.56, 5.35)	0.45
	Rural	7.20	7.73	(4.50, 10.97)	-0.53
IMR (‰)	National	4.50	4.67	(2.45, 6.88)	-0.17
	Urban	2.90	2.47	(0.92, 4.02)	0.43
	Rural	5.20	5.42	(2.72, 8.12)	-0.22
NMR (‰)	National	2.80	2.91	(1.14, 4.68)	-0.11
	Urban	1.70	1.34	(0.36, 2.71)	0.36
	Rural	3.20	3.39	(1.11, 5.68)	-0.19

Abbreviations: MMR: maternal mortality ratio; U5MR: under-five mortality rate; IMR: infant mortality rate; NMR: neonatal mortality rate; 95% CI: 95% confidence interval.

Table S4. Prediction errors of each health indicator under different ϵ values

Indicators	ϵ	MAE (Training)	RMSE (Training)	MAE (Validation)	RMSE (Validation)	Optimal ranking*
National MMR	0.01	2.070	3.158	0.741	0.795	1
	0.10	2.069	3.158	0.748	0.803	2
	1.00	2.066	3.157	0.817	0.878	3
Urban MMR	0.01	2.754	3.594	0.754	0.857	1
	0.10	2.754	3.595	0.754	0.855	2
	1.00	2.754	3.596	0.757	0.841	3
Rural MMR	0.01	3.197	4.785	0.860	1.154	1
	0.10	3.197	4.785	0.863	1.161	2
	1.00	3.202	4.783	0.900	1.236	3
National U5MR	0.01	1.031	1.412	0.308	0.355	1
	0.10	1.030	1.411	0.317	0.367	2
	1.00	1.021	1.401	0.420	0.478	3
Urban U5MR	0.01	0.709	0.991	0.449	0.502	1
	0.10	0.709	0.991	0.456	0.510	2
	1.00	0.710	0.989	0.516	0.585	3
Rural U5MR	0.01	1.227	1.655	0.175	0.211	1
	0.10	1.227	1.655	0.184	0.220	2
	1.00	1.227	1.649	0.271	0.316	3
National IMR	0.01	0.738	1.089	0.242	0.282	1
	0.10	0.737	1.087	0.252	0.294	2
	1.00	0.725	1.070	0.349	0.413	3
Urban IMR	0.01	0.489	0.765	0.176	0.195	1
	0.10	0.489	0.764	0.183	0.201	2
	1.00	0.496	0.758	0.246	0.267	3
Rural IMR	0.01	0.907	1.267	0.157	0.196	1
	0.10	0.907	1.266	0.163	0.204	2
	1.00	0.910	1.254	0.237	0.302	3
National NMR	0.01	0.614	0.881	0.404	0.474	3
	0.10	0.666	0.941	0.138	0.163	1
	1.00	0.652	0.916	0.234	0.273	2
Urban NMR	0.01	0.458	0.769	0.105	0.110	1
	0.10	0.458	0.767	0.112	0.118	2
	1.00	0.457	0.759	0.179	0.194	3
Rural NMR	0.01	0.815	1.142	0.132	0.153	1
	0.10	0.814	1.139	0.135	0.152	2
	1.00	0.808	1.121	0.155	0.192	3

Abbreviations: MMR: maternal mortality ratio; U5MR: under-five mortality rate; IMR: infant mortality rate; NMR: neonatal mortality rate; MAE: mean absolute error; RMSE: root mean squared error.

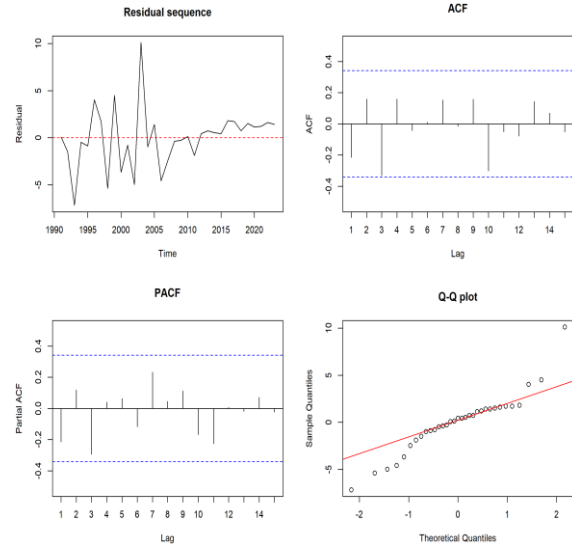
Table S5. The urban-rural disparities of health indicators from 2024 to 2030

Indicators		2024	2025	2026	2027	2028	2029	2030	Urban AGR	Rural AGR	GAP-1 (95% CI)	GAP-2 (95% CI)	Z _{GAP-1}	Z _{GAP-2}	P _{GAP-1}	P _{GAP-2}
MMR	RD (per 100,000)	2.21	0.67	-0.68	-2.55	-4.12	-3.79	-2.90	-10.67%	-21.78%	0.49 (0.44, 0.54)	-51.01% (-60.80%, 41.20%)	-14.26	-10.20	< 0.001	< 0.001
	RR	1.18	1.06	0.93	0.72	0.49	0.47	0.53								
U5MR	RD (‰)	3.23	2.70	2.30	2.01	1.78	1.42	0.94	-21.33%	-19.92%	1.07 (0.97, 1.18)	7.08% (-2.80%, 16.80%)	1.35	1.40	0.176	0.162
	RR	1.98	1.97	2.03	2.18	2.52	2.82	2.21								
IMR	RD (‰)	2.51	2.41	2.30	2.12	2.06	1.49	1.07	-20.89%	-16.42%	1.27 (1.15, 1.40)	27.22% (17.20%, 36.80%)	4.78	5.40	< 0.001	< 0.001
	RR	2.08	2.27	2.62	3.21	4.55	3.57	2.84								
NMR	RD (‰)	1.66	1.42	1.14	0.73	0.30	0.30	0.30	-19.51%	-22.31%	0.87 (0.79, 0.96)	-12.55% (-22.30%, -2.70%)	-2.78	-2.50	0.005	0.012
	RR	2.33	2.53	3.00	3.15	1.88	1.88	1.88								

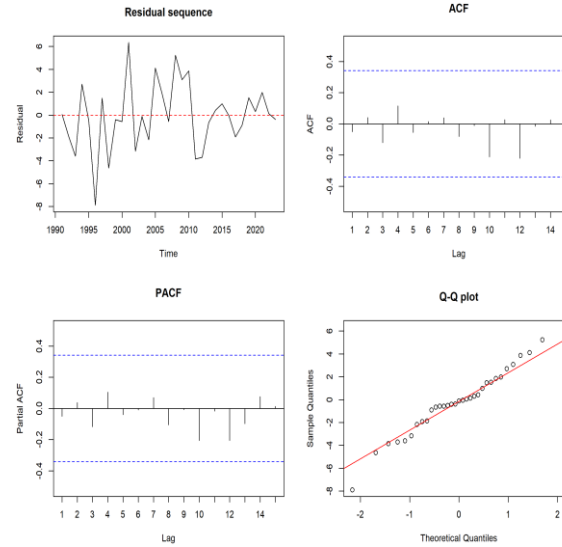
Note: GAP-1 reflects the multiple relationship of urban and rural growth rates, making it appropriate for long-term trend analysis. GAP-2 highlights the difference in improvement speed between urban and rural areas, rendering it suitable for evaluating policy effectiveness. MMR: maternal mortality ratio; U5MR: under-five mortality rate; IMR: infant mortality rate; NMR: neonatal mortality rate; RD: rate difference; RR: rate ratio; AGR: average growth rate; 95% CI: 95% confidence interval.

Figure S1. The results of residual analysis for MMR at the national, urban, and rural levels

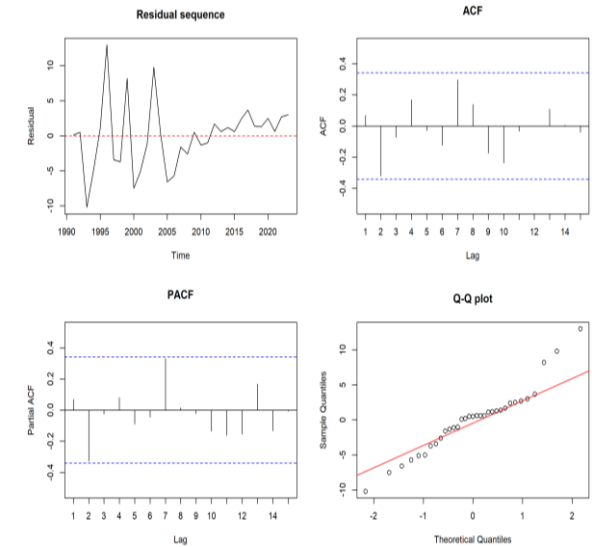
National MMR



Urban MMR

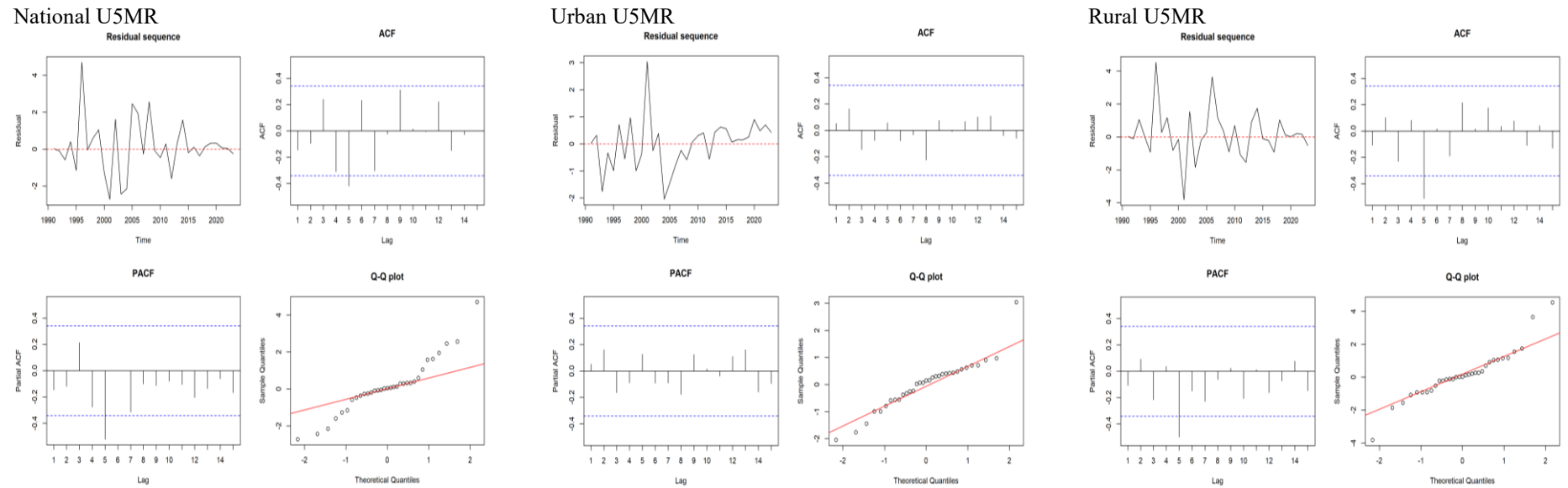


Rural MMR



Abbreviations: MMR: maternal mortality ratio; ACF: autocorrelation function; PACF: partial autocorrelation function; Q-Q plot: quantile-quantile plot.

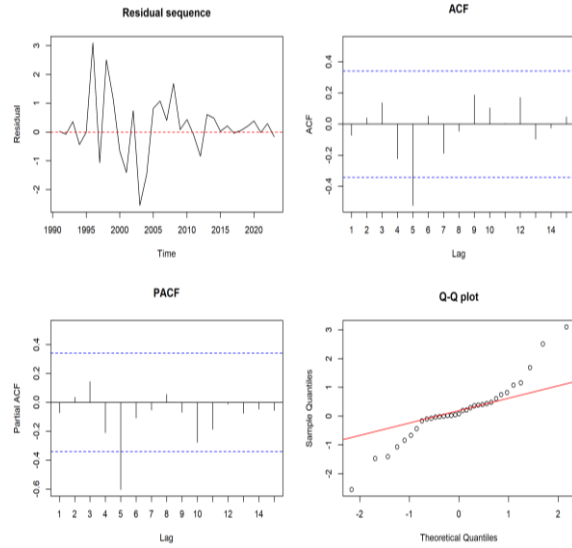
Figure S2. The results of residual analysis for U5MR at the national, urban, and rural levels



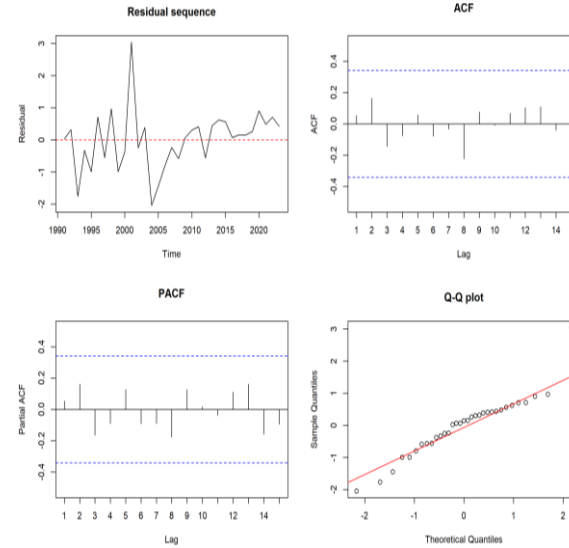
Abbreviations: U5MR: under-five mortality rate; ACF: autocorrelation function; PACF: partial autocorrelation function; Q-Q plot: quantile-quantile plot.

Figure S3. The results of residual analysis for IMR at the national, urban, and rural levels

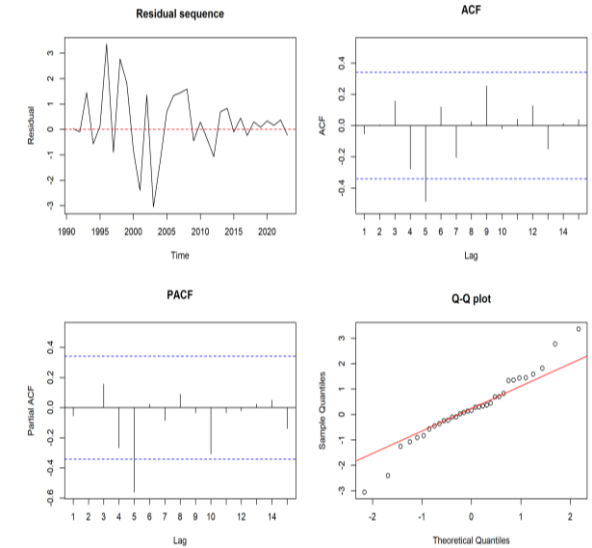
National IMR



Urban IMR

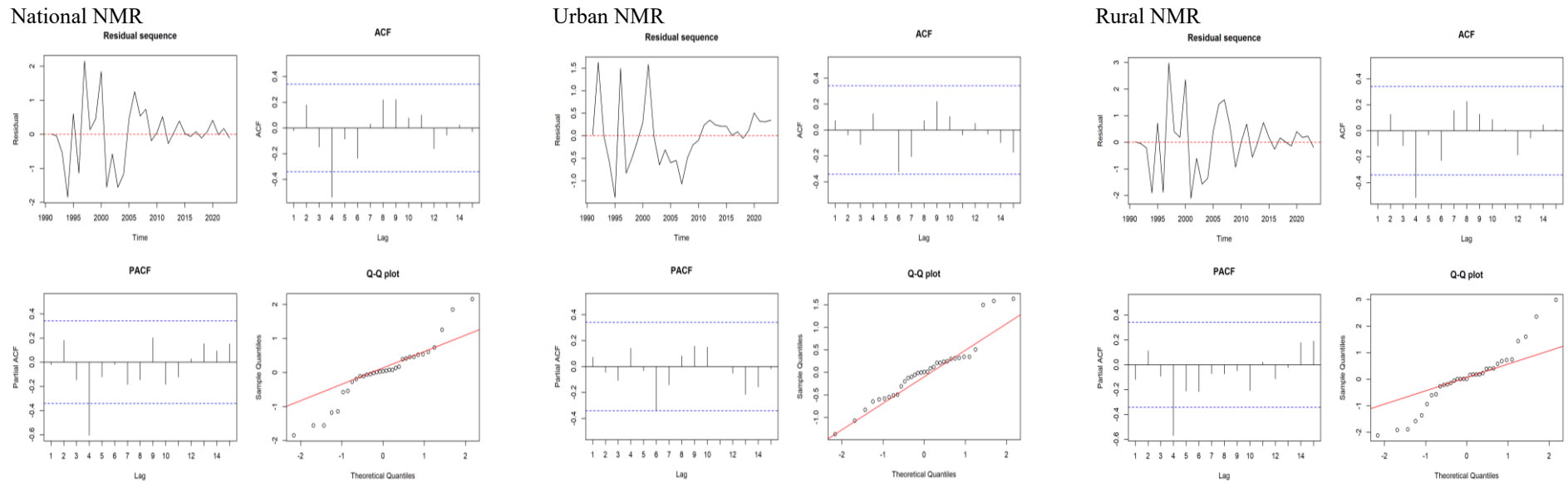


Rural IMR



Abbreviations: IMR: infant mortality rate; ACF: autocorrelation function; PACF: partial autocorrelation function; Q-Q plot: quantile-quantile plot.

Figure S4. The results of residual analysis for NMR at the national, urban, and rural levels



Abbreviations: NMR: neonatal mortality rate; ACF: autocorrelation function; PACF: partial autocorrelation function; Q-Q plot: quantile-quantile plot.