

HSE/World Bank Conference

*New Challenges of Demographic, Epidemiological and
Medical-Technological Development: Search for New Models
of Healthcare Developments*

15 December 2021

Challenges Posed to Healthcare Systems in the UK and Russia during Covid-19 and the Influences of Priorities, Shortages, and Rationing

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Russian Presidential Academy of the National Economy and Public Administration (2013-2021)

C. Davis Relevant Publications on Health Systems

Recent Publications:

Davis, C. (2021, April, *PCE2*) ***Readiness and resilience of the health systems of the UK and Russia during Covid-19 epidemics in 2020-2021: impacts of priorities, shortages and rationing*** *Post-Communist Economies*, Free Access at:

<https://www.tandfonline.com/doi/full/10.1080/14631377.2020.1867433?src=>

Davis, C. (2020, September, *PCE1*) ***Priorities, shortages, and rationing in the UK and Russia national health services during 2000–2019: Initial conditions for responses to Covid-19*** *Post-Communist Economies*, 32(8), 969–1010, Free Access at:

<https://doi.org/10.1080/14631377.2020.1800317>

Past Publications:

Davis, C. (1990) ***National Health Services, Resource Constraints and Shortages: A Comparison of British and Soviet Experiences***, Chapter in Manning, N. (ed.) (1990) 1989-90 Social Policy Review, London, Longman.

Davis, C. (1989) ***Priority and the Shortage Model: The Medical System in the Socialist Economy*** in Davis, C. and Charemza, W. (eds.) (1989) Models of Disequilibrium and Shortage in Centrally Planned Economies, London, Chapman and Hall.

Introduction

- My recent and past publications indicate that I have studied the health systems of the UK and Russia before and during Covid-19 epidemics, and that there is conceptual continuity in my research.
- However, I am making this presentation in Panel 4 of the conference after many topics, such as morbidity and mortality of Covid-19, have been capably analysed by previous speakers. I would like to avoid repeating material, which is provided in my *Free Access* articles.
- I therefore intend to discuss the evolution of the concepts and methods that I used in my Covid-19 articles, with a focus on issues that have not yet been fully discussed, such as health production, morbidity icebergs, priorities, shortages, and rationing. I will try to relate these concepts to the theme of the conference: the inter-relationships between health systems, demography, epidemiology, and medical technology.
- I then will present briefly my analyses of the readiness of the UK and Russia health systems for Covid-19 epidemics and their resilience in coping with them.

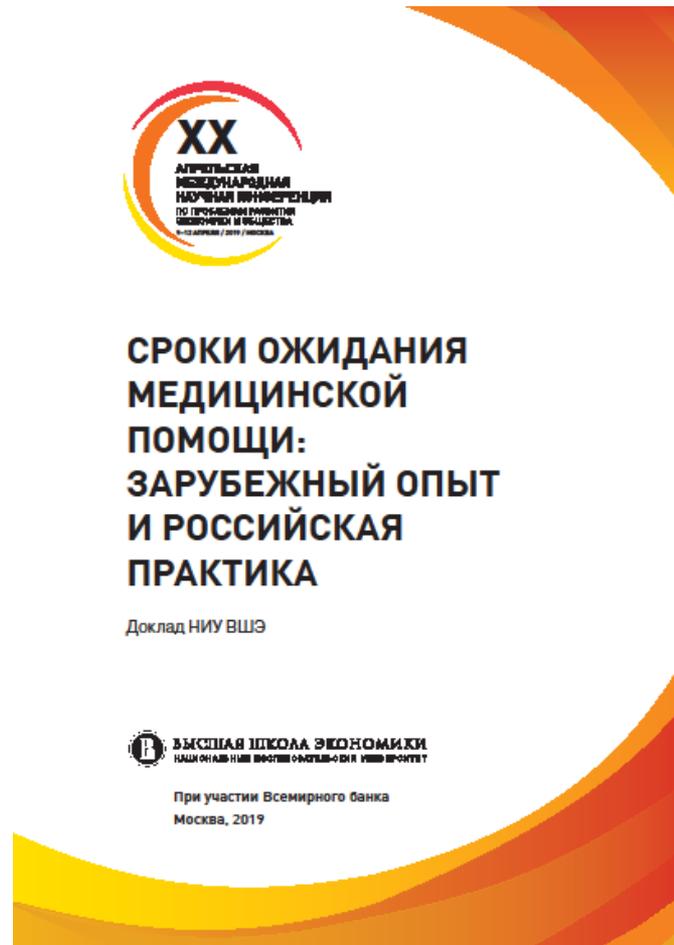
Structure of Presentation

1. Concepts
2. Readiness of UK and Russia Health Systems for the Challenges of Covid-19 (*PCE 1: History 2000-2019*)
3. Resilience of the UK and Russia Health Systems in Coping with Covid-19 (*PCE 2: History January 2020 – March 2021*)
4. Lessons from the Experiences of the UK and Russia Health Systems during Covid

Inspirations for my Covid-19 and Health Systems Articles

- I studied shortages and rationing in the UK and USSR/Russia health systems in the past and over recent years I became aware that these phenomena were more pronounced following the Global Financial Crisis and austerity policies.
- My inspiration in Spring 2019 for resuming work on these issues came from a publication of Russian colleagues at HSE, who are involved in the conference today today (Sergey Shishkin, Igor Sheiman, Svetlana Sazhina), entitled: *Сроки ожидания медицинской помощи: зарубежный опыт и российская практика* [*Waiting Times for Medical Assistance: Foreign Experience and Russian Practice*].
- We provisionally agreed to co-author an article related to our mutual interests, but we determined in autumn 2019 that we had differences in our concepts and methodologies, so I proceeded on my own course.
- I completed my article in February 2020 and it was provisionally accepted by the *Journal of Post-Communist Economies*. However, when the Covid-19 pandemic started the Editor and I agreed that I would modify my submitted article to cover the issue of Readiness (preparedness) of the UK and Russia health systems (*PCE1*) and produce a new article about the Resilience (responses) of these health systems during Waves 1 and 2 of their epidemics (*PCE2*).

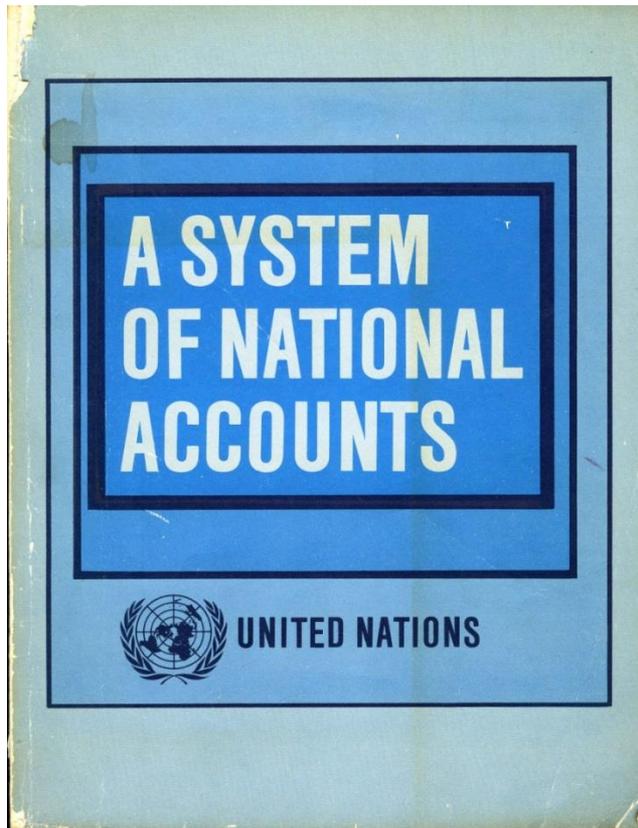
Inspiration: HSE Publication by Shishkin, Sheiman, Sazhina et al. on *Waiting Times*



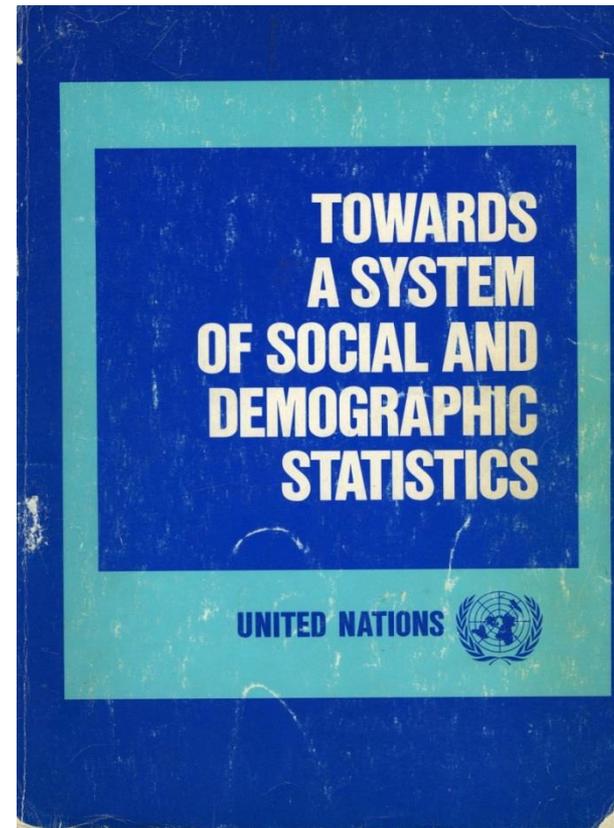
Concepts Used in *PCE1* and *PCE2* Articles about Health Systems and Covid-19

- Health Production Process Linking Population, Morbidity, Health System, Mortality and the Economy (Technology)
- International Comparison of Health Systems
- Morbidity Icebergs: Hidden and Reported Illness
- Shortages in Health Systems: Consequences and Policy Responses
- State Priorities Related to Resource Allocation and Medical Care

Health in National Economic and Socio-Demographic Accounts: Sir Richard Stone



SNA: Stock-flow models, transactors and markets, comparison of economies

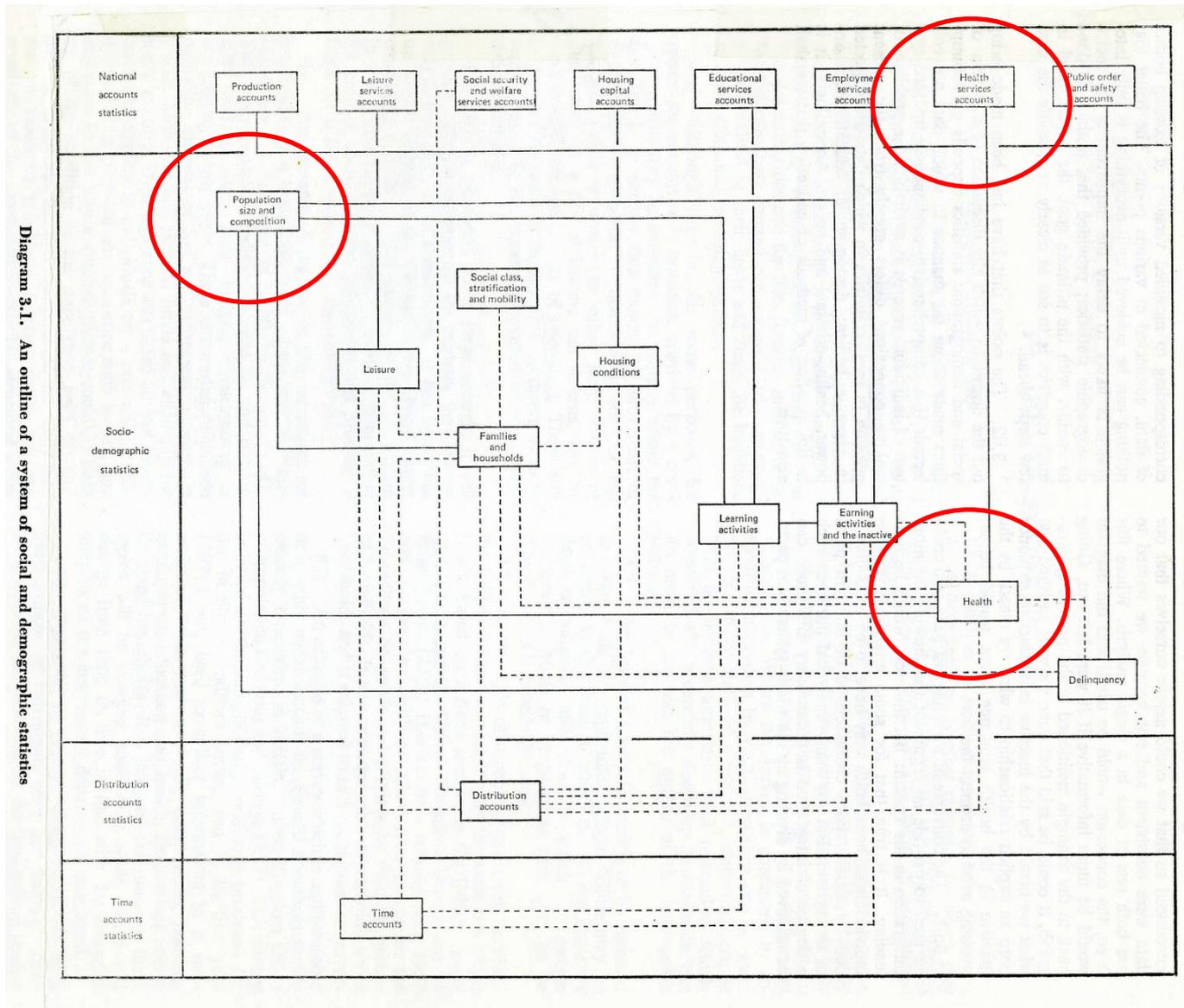


SSDS: Extends accounts to sphere, absorbing markov chain and other stock-flow models

Health System and Health Production

- National Accounting Approach
 - Define economic activity
 - Identify economic institutions (Health System: Households (Population), Medical System, Medical Supply, Medical Industry, Biomedical R&D, Medical Foreign Trade, Central Authorities)
- Establish production boundaries and describe production process
- Models of transactions and production in the Health System

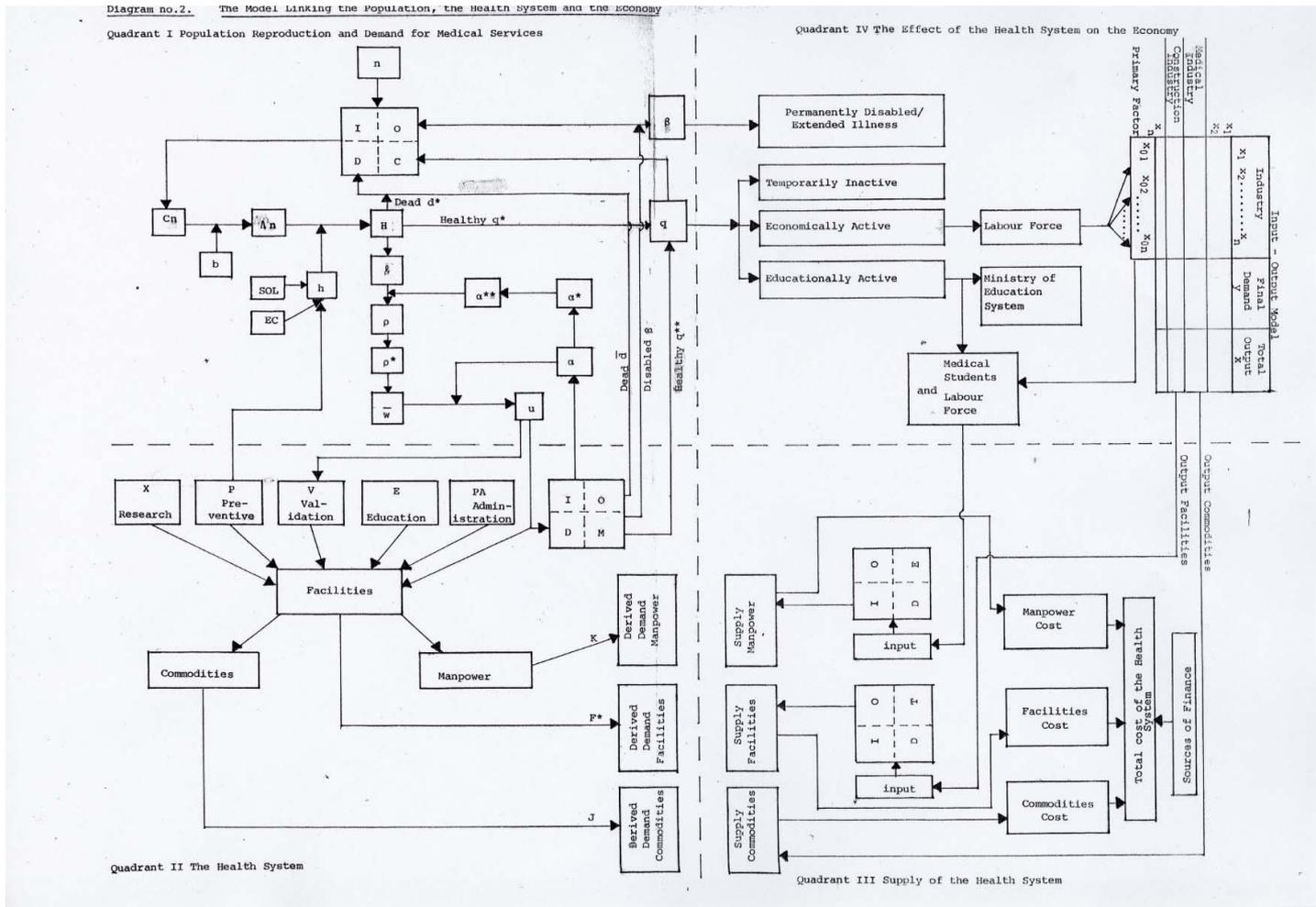
Health in the SSDS



Davis 1980 Ph.D. SSDS Model Linking Population, Health System, and Economy

Quadrant I: Population and Illness

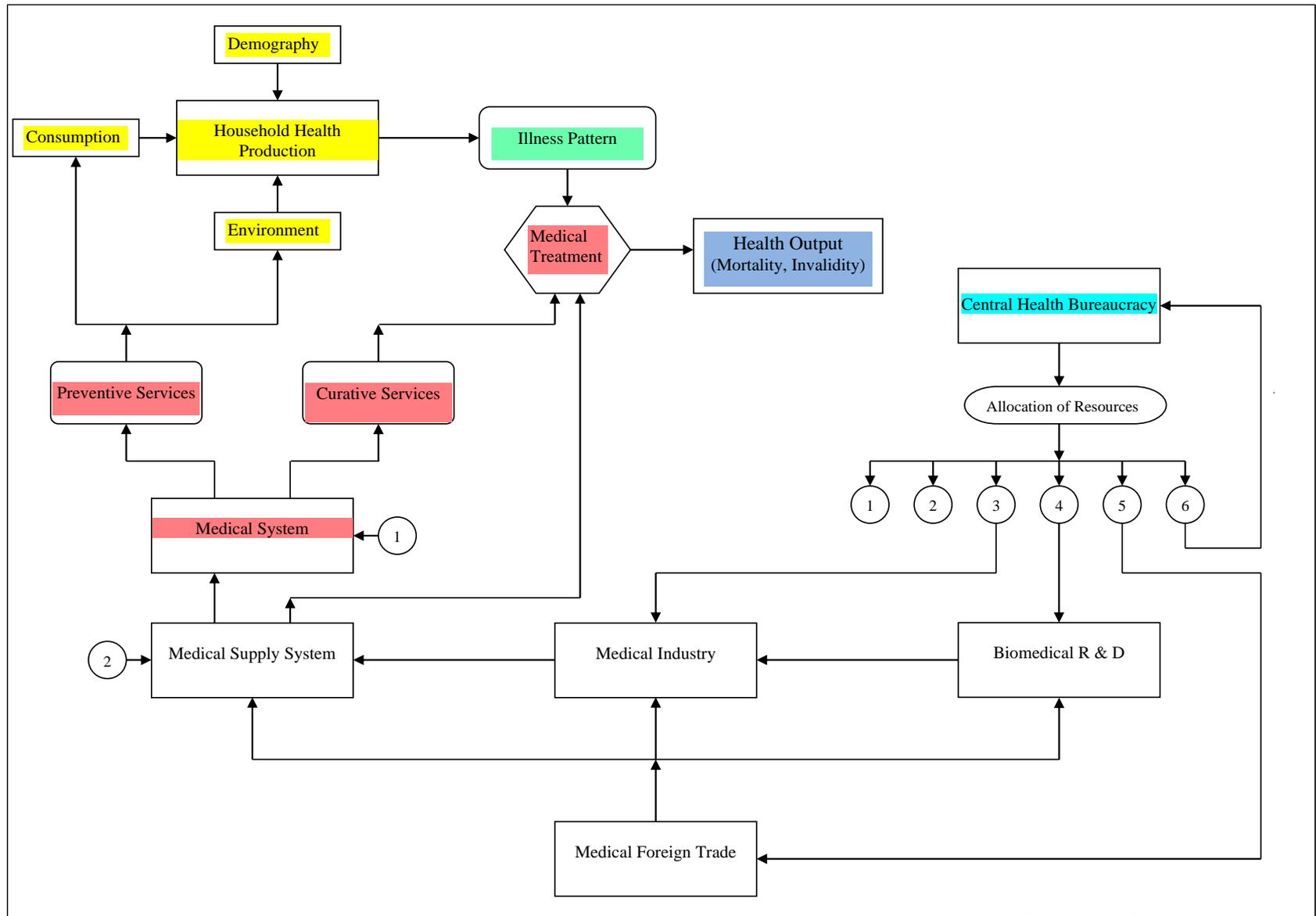
Quadrant IV: Links to Economy



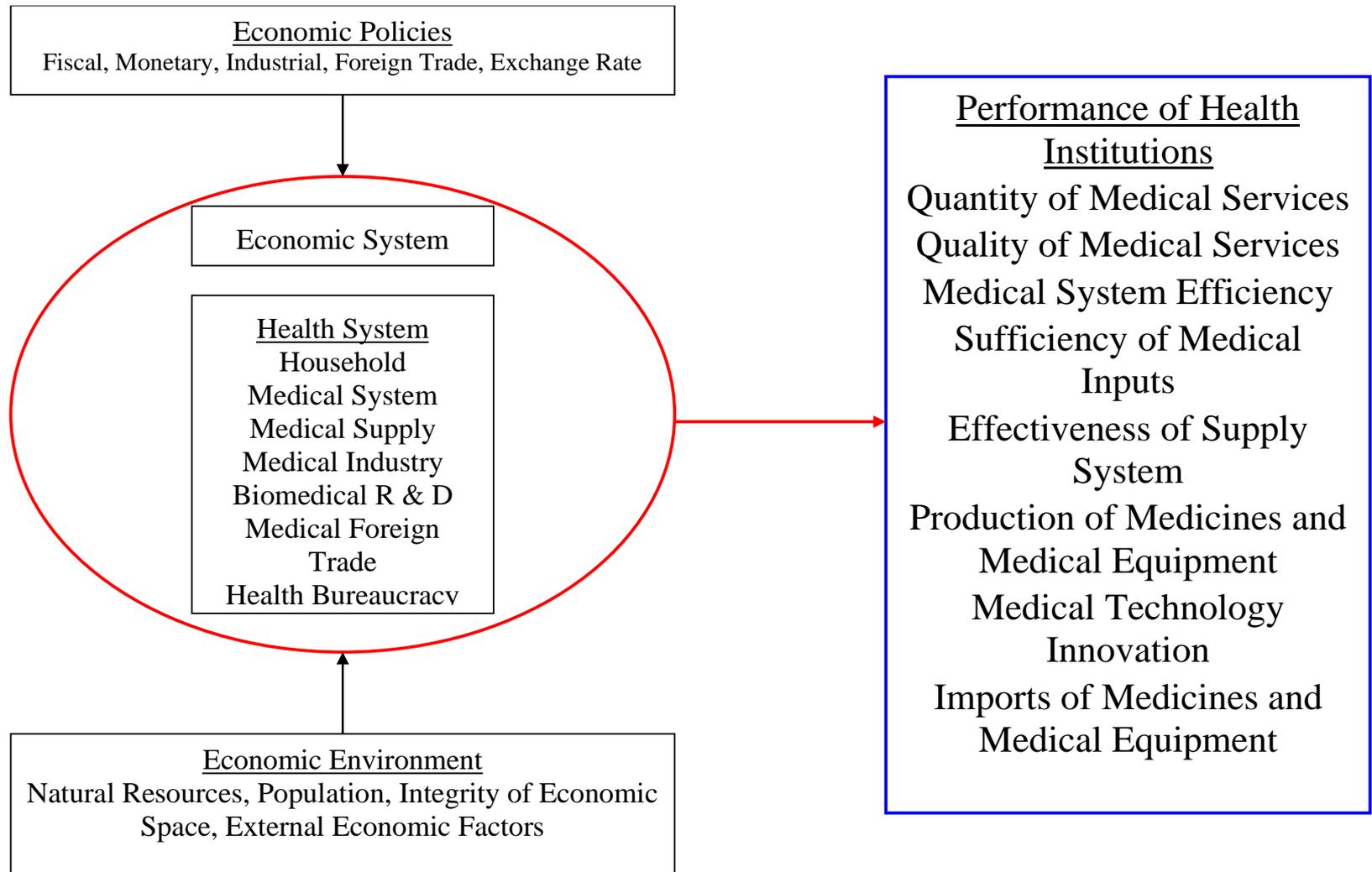
Quadrant II: Health System

Quadrant III: Inputs to Health System

General Health System Production Process



Health System in an Economic System



Davis 2013

Comparison of Health Systems

- NHS in USSR and UK in 1980s (Davis 1990)
- Soviet/Russian and East European HS in Command and Transition Periods. Numerous publications, including:
 - C. Davis (2001) *Reforms and Performance of Medical Systems in the Transition States of the Former Soviet Union and Eastern Europe*, International Social Security Review, vol. 54, No. 2-3
 - C. Davis (2010) *Understanding the legacy: health financing systems in the USSR and Eastern Europe prior to transition* in WHO Implementing Health Financing Reforms: Lessons From and For Countries in Transition
- Comparison of Health Systems in Countries Carrying Out Health Reforms: China, Russia, UK, USA (Davis 2009-12 Presentations)
- Davis (2020 (*PCE1*) and 2021 (*PCE2*)) compare UK and Russia

Morbidity Icebergs: Important During Covid-19 Epidemics

Concepts of Epidemiology

Integrating the ideas, theories, principles and methods of epidemiology

SECOND EDITION

Raj S. Bhopal, CBE, MD, DSc (hon), MPH,
BSc (hon), MBChB, FFPH, FRCP(E)
Alexander Bruce and John Usher Professor of Public Health
and
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University of Edinburgh, Scotland
formerly
Professor and Head of the Department of Epidemiology
and Public Health
University of Newcastle Upon Tyne

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- 1 Diseased, diagnosed and controlled
- 2 Diagnosed, uncontrolled
- 3 Undiagnosed or wrongly diagnosed disease
- 4 Risk factors for disease
- 5 Free of risk factors

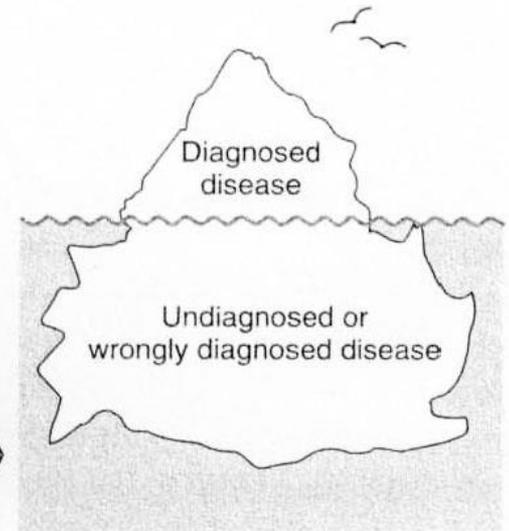
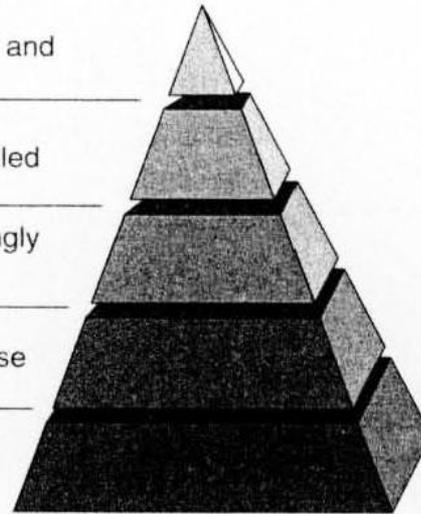
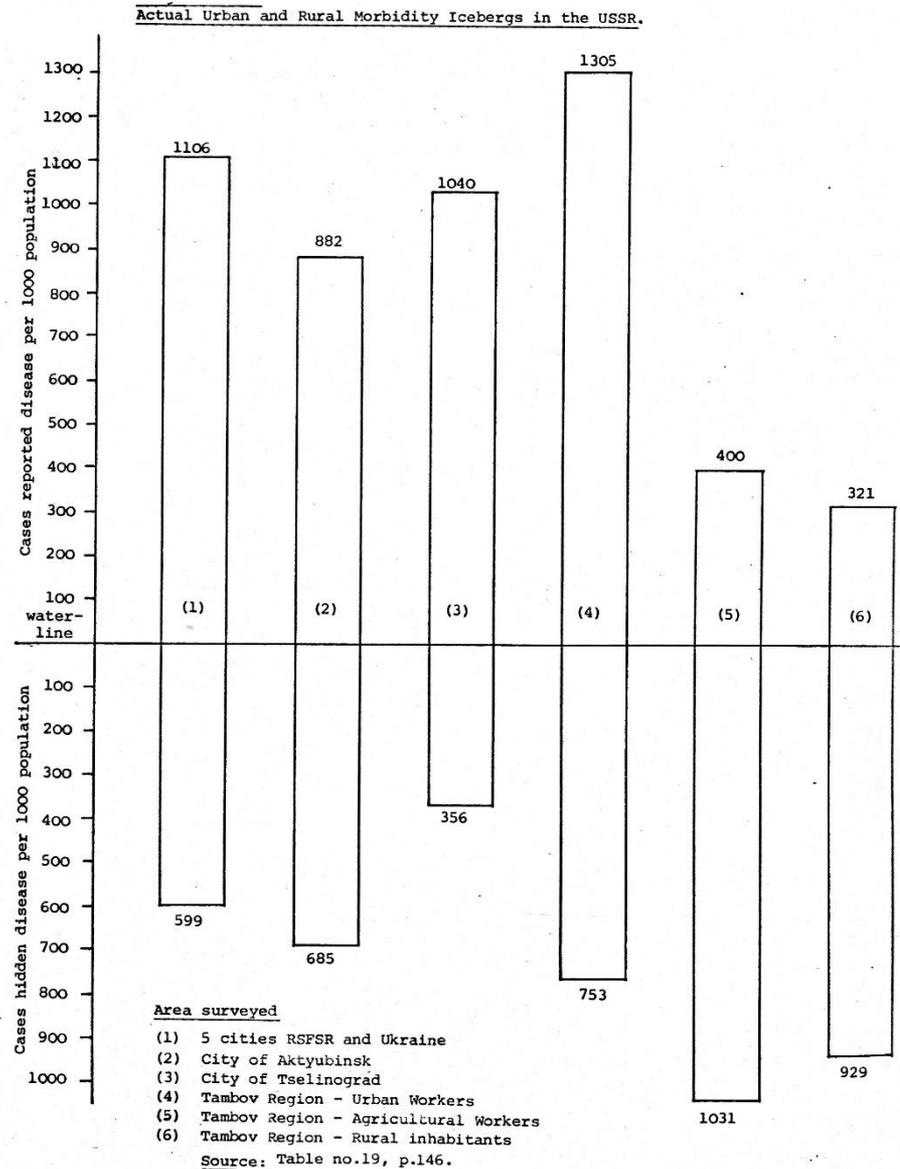


Fig. 6.6 Pyramid of health and disease: building on the iceberg of disease.

Morbidity Icebergs in the USSR



Morbidity Iceberg in Novgorod Region, Russia in 2005

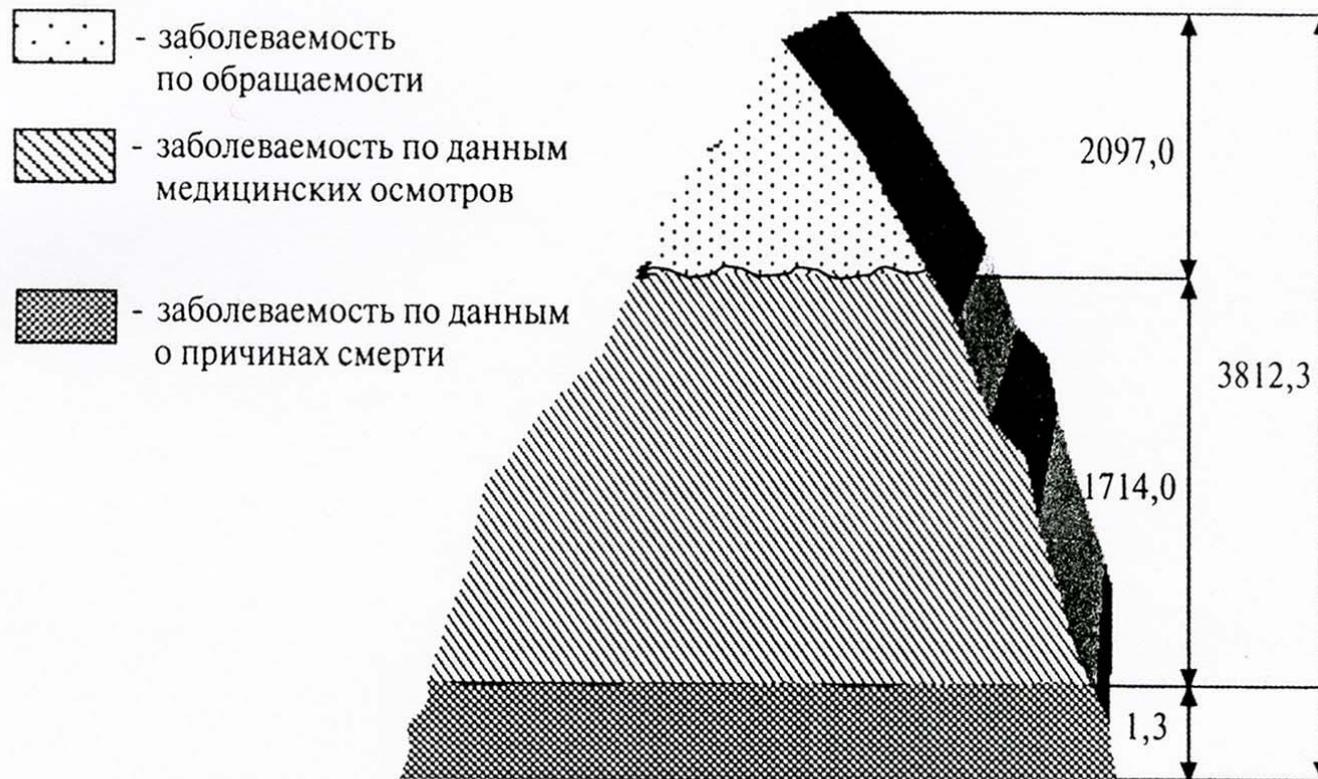


Рис. 3.3. Исчерпанная (истинная) заболеваемость населения Новгородской области по результатам специально проводимых исследований (2005).

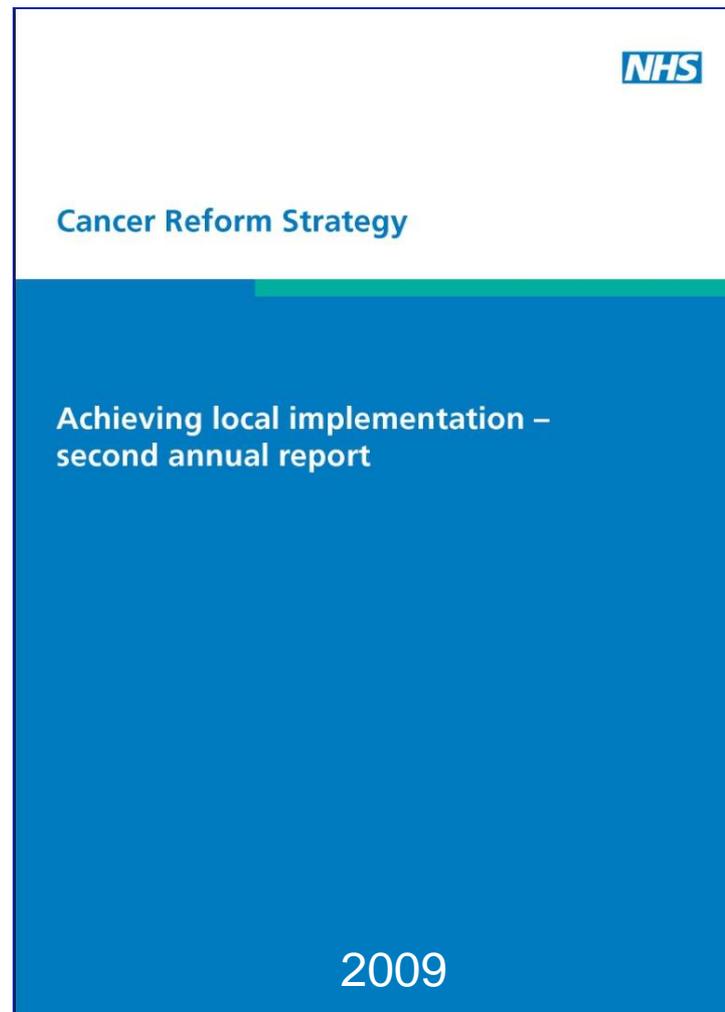
Complete and Reported Illness by Disease Category: Novgorod 2005



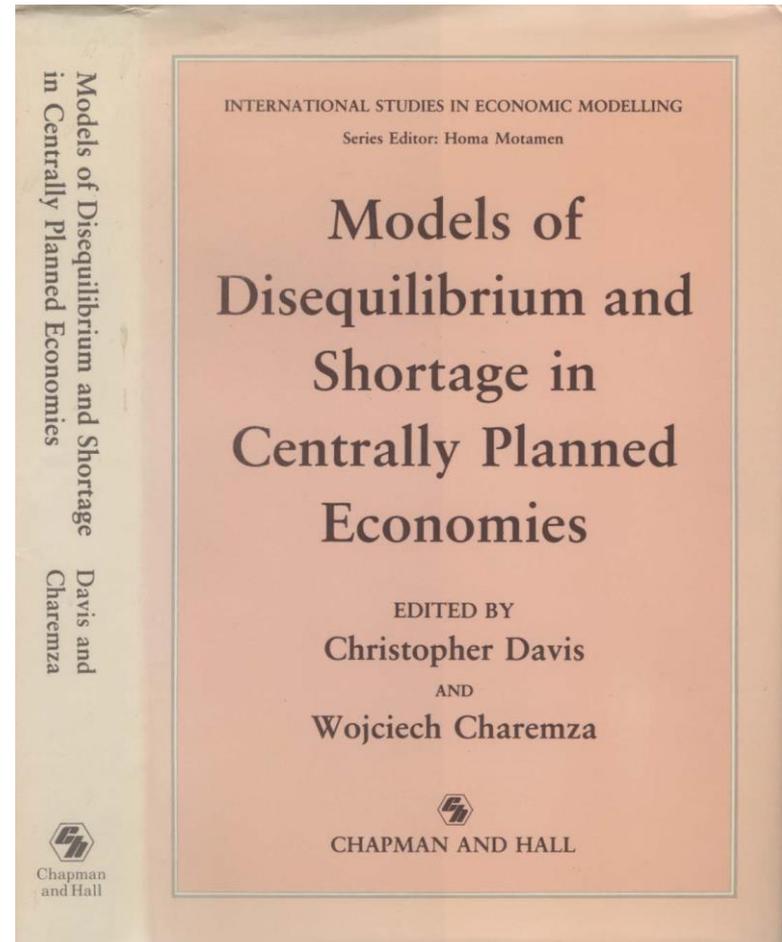
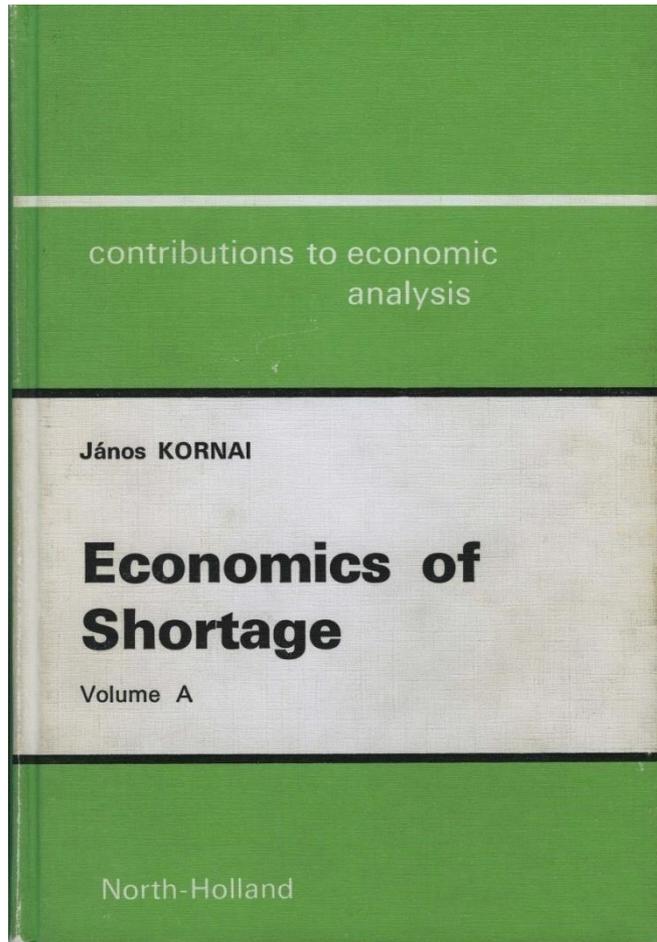
Рис. 2.15. Сравнительный анализ исчерпанной заболеваемости населения Новгородской области по результатам специально проведенного исследования и данным государственной статистики

Morbidity Icebergs in UK Pre-Covid: Unreported Illness and Late Diagnoses

- Late diagnosis has been a major factor in the poorer survival rates in England compared with other countries in Northern and Western Europe
- One-year survival data show that the later the diagnosis, the greater the likelihood of a person with cancer not surviving for a year.
- UK made efforts to achieve earlier diagnoses.

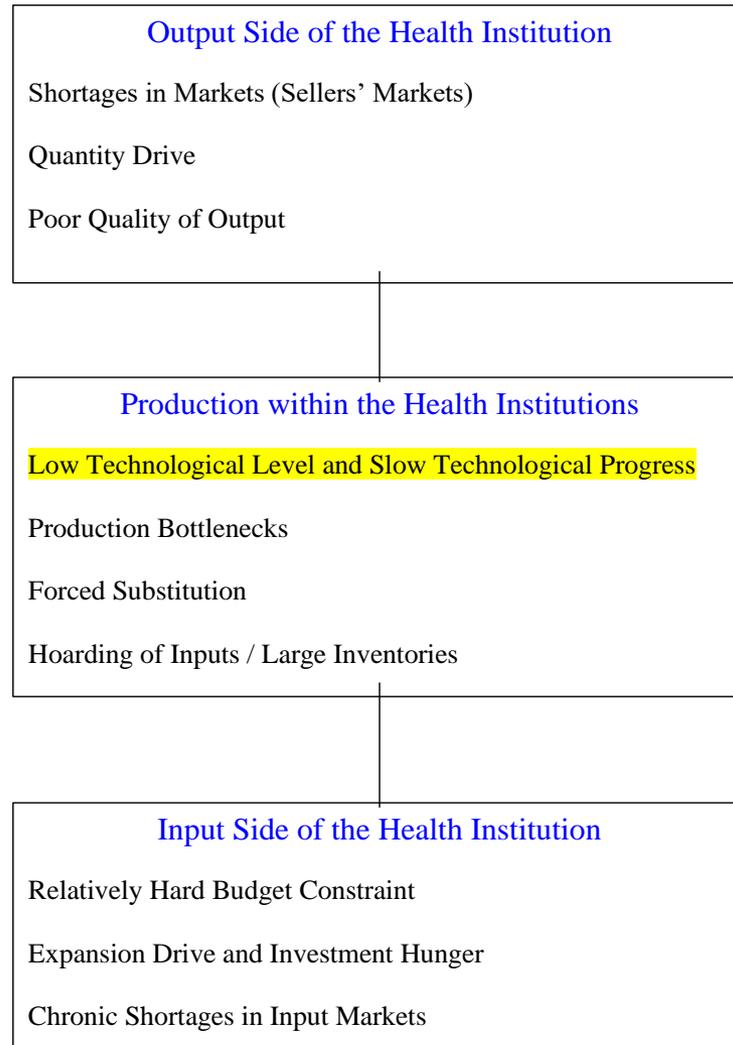


Shortages in Health Systems are Related to Shortages in Economies



Davis, C. (1989) *Priority and the Shortage Model: The Medical System in the Socialist Economy*

Conditions and Behaviour of Health Institutions in the Shortage Economy



Categories of Shortages in the Health Systems Before and During Covid-19

Row	Category of Shortage
A	Doctors: National shortages
B	Doctors: Shortages in rural areas and deprived regions
C	Doctors: Shortages of specialists
D	Middle Medical Personnel (MMP): National shortages
E	MMP: Shortages in rural areas and deprived regions
F	MMP: Shortages of specialists
G	Shortages of medicines and medical inputs
H	Shortages of medical equipment
I	Shortages of hospital facilities and beds
J	Shortages of outpatient facilities
K	Shortages in emergency care

Consequences of Shortages in National Health System and Policy Responses

Row	Description of Consequences of Shortages
A	Deficits of specific inputs cause bottlenecks and inefficiencies in production.
B	Shortage-related problems cause higher stress and lower motivation of medical personnel.
C	Shortages discourage patients from reporting illnesses, which become 'hidden'.
Row	Description of Policy Responses to Shortages
D	Revision of medical priorities.
E	Rationing according to category of patient (sub-systems of medical care).
F	Rationing by physical queuing.
G	Rationing by waiting lists.
H	Exclusion of types of medical services from <i>State Guarantee</i> or restrictions on them.
I	Substitution of inferior and less expensive inputs for the normal ones.

Priorities Affecting and Within Health Systems

- Ericson (1987) defines priority as follows:
 - *Priority is an expression of the degree of the leadership's commitment to ensure that objectives concerning a sector, a program or social group are attained irrespective of circumstances in the economy or a market.*
- Health systems are strongly influenced by the priorities of the state and can have high or low priority status.
- Managers of health systems rely on priorities to determine resource allocation and treatment decisions, especially during periods of severe financial constraints or excess demand (Covid-19).

Low and High Priority of Health Systems

Row	Indicators of Priority Status of NHS	Low Priority	High Priority
		Differing Priority Characteristics of the NHS	
	<i>During Plan/Budget Formulation</i>		
A	Health in Leadership's Objective Function (OF)	Low Weight in OF. Trade-Offs Tolerated between Health and Other Objectives.	High Weight in OF. Minimal Trade-Offs between Health and Other Objectives.
B	Resource Allocation Responsiveness to Problems	Unresponsive	Responsive
C	Wage Rates and Labour Conditions	Relatively low wage rates and poor labour conditons	Relatively high wage rates and bonuses and good labour conditons
D	Adequacy of Financial Norms in Budgets	Stingy	Generous
<i>During Plan/Budget Implementation</i>			
E	Outputs	Modest targets. Minimal help provided to ensure fulfilment.	Ambitious targets and strong commitment to their fulfilment.
F	Budget Constraints	Relatively Hard	Soft
G	Supply Plans	Tolerance of Disruptions	Strong commitment to fulfilment of supply plans
H	Siphoning of Supplies	Scarce Inputs Siphoned Away from Low Priority NHS by Higher Priority Organisations	High Priority Protects NHS from External Siphoning, But It Occurs Internally According to Priorities
I	Investment Plans	Low targets and tolerance of underfulfilment	Ambitious plans and strong commitment to fulfilment
J	Inventories of Inputs	Low Input Inventories	Generous input inventories
K	Reserve Production Capacity	Minimal	Significant relative to normal outputs
L	Shortage Intensity	High	Low

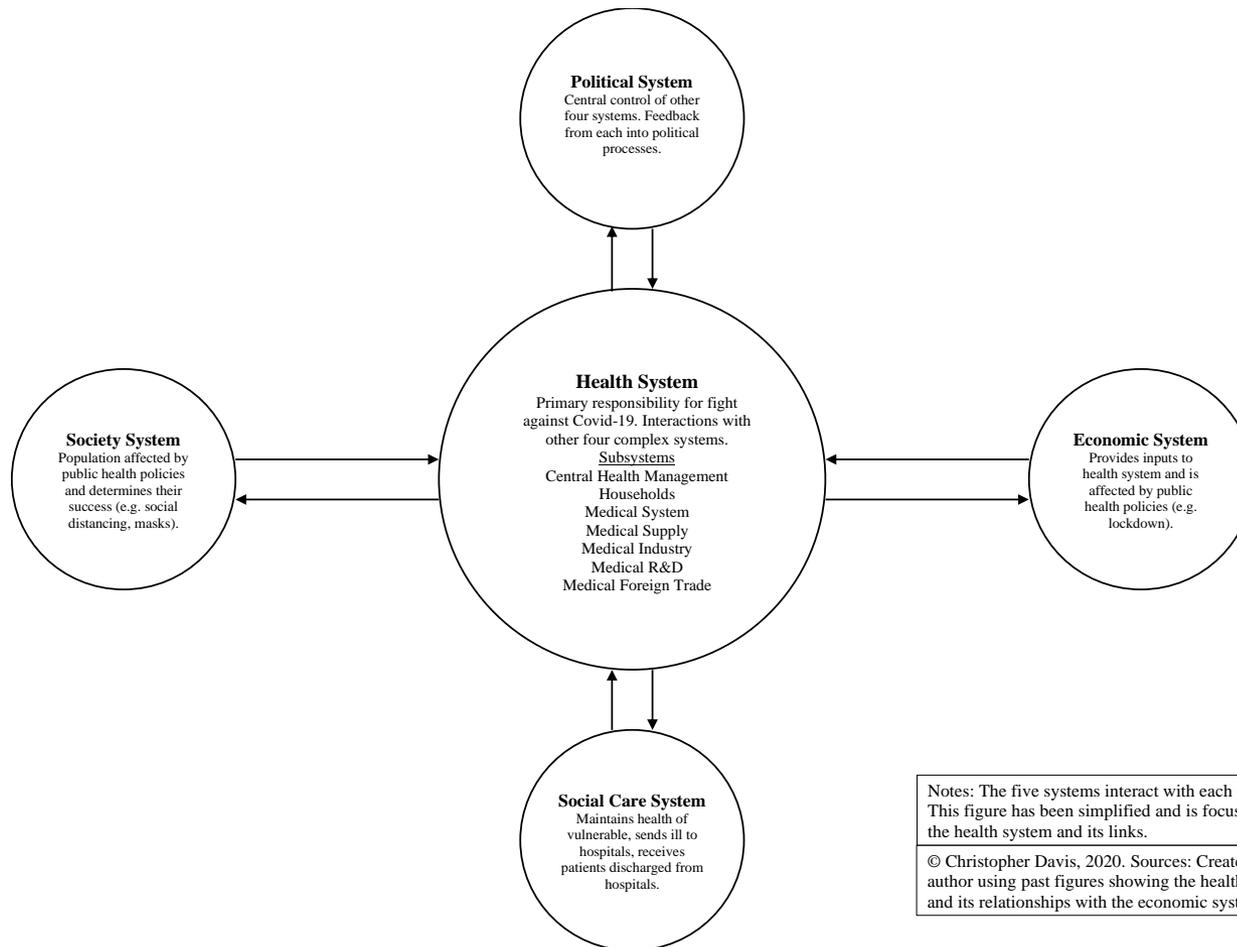
Davis (1989): Priority Indicators of Soviet Health During Plan Formulation

Weight in Planner's Preference Function
$\max V \equiv \sum_l v_l X_l \text{ s.t. } \mathbf{AX} \leq \mathbf{R}$
$\frac{X_h(t)}{G(t)} < \frac{\bar{X}_h(t)}{\bar{G}(t)}$
Resource Allocation Responsiveness to Tolerance Limit Violations
$\frac{b_h(t+1)}{B(t+1)} > \frac{b_h(t)}{B(t)} > \text{if } C(t+1) > C(t) = \rho$
Relative Wage Rates
$\frac{W_h}{W} < \frac{E_h}{E}$
USSR 1975: 0.7 < 2.3
Adequacy of Financial Norms
$b_h^0 = \sum_i F_i \bar{a}_i < \sum_i \bar{p}_i \bar{a}_i = b_h^*$

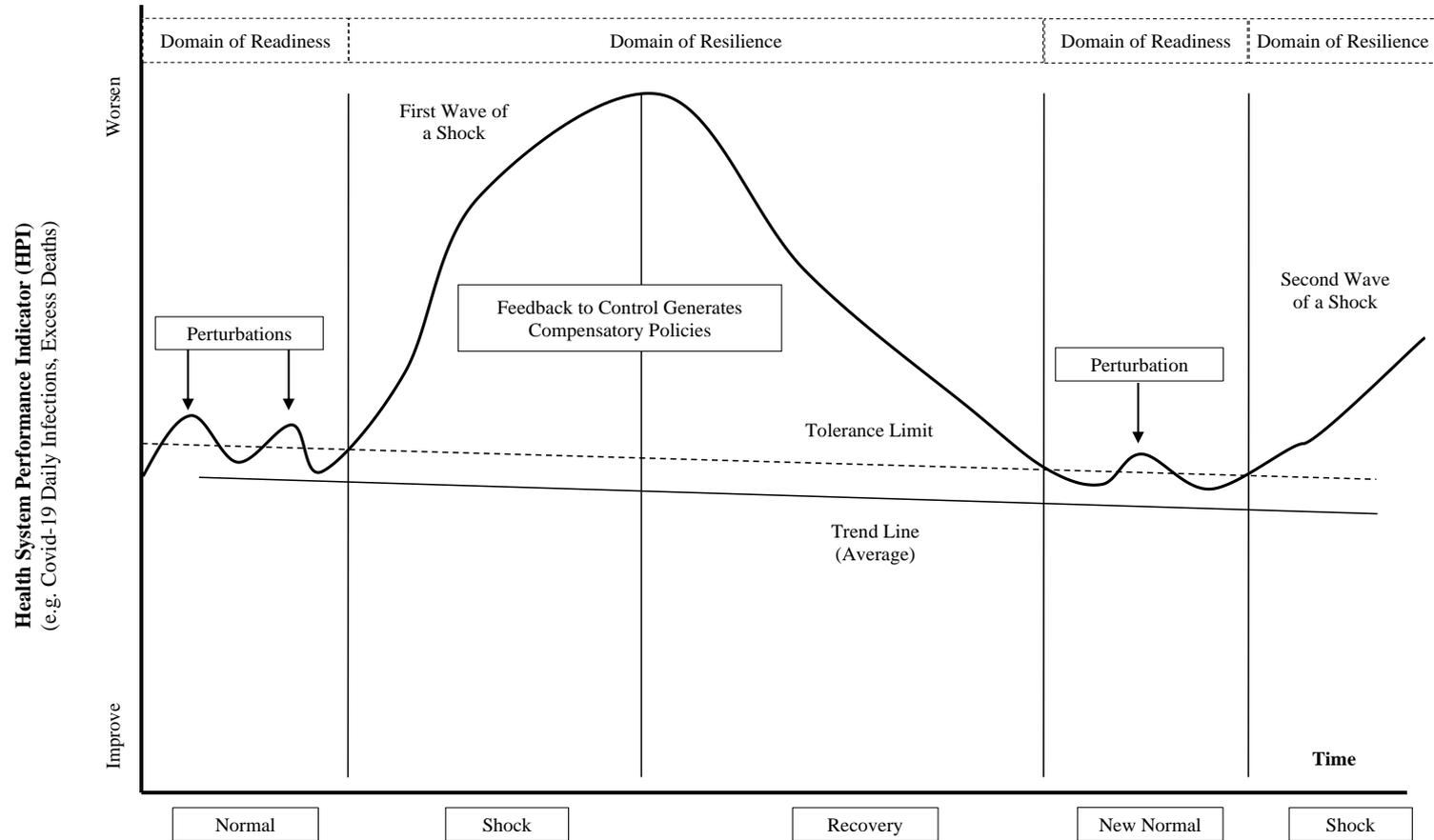
Davis (1989): Priority Indicators of Soviet Health During Plan Implementation

Fulfilment of Output Plan
$\overline{\overline{X_h}}(t) < \overline{X_h}(t)$
Hardness of Budget Constraints
$b_h^e = \sum_i \overline{p_i} \overline{a_i} \leq b_h^0 = \sum_i F_i \overline{a_i}$
Fulfilment of Supply Plan
$\sum_i p_i (\overline{a_{ih}} - \overline{a_{ih}}) < \frac{1}{n} \sum_l \left(\sum_i p_{il} (\overline{a_{il}} - \overline{a_{il}}) \right)$
Fulfilment of Investment Plan
$\frac{\overline{\overline{I_h}}(t)}{\overline{I_h}(t)} < \frac{1}{n} \sum_l \left(\frac{\overline{\overline{I_l}}(t)}{\overline{I_l}(t)} \right)$
Degree of Shortage Intensity
$Z_h(t) > Z(t) = \frac{1}{n} \sum_l Z_l(t)$

Interactions of Complex Systems Related to Covid-19 Epidemic



Readiness and Resilience of Health Systems Experiencing Shocks (Covid-19)



Phases of Complex Health System Development in Periods of Shocks

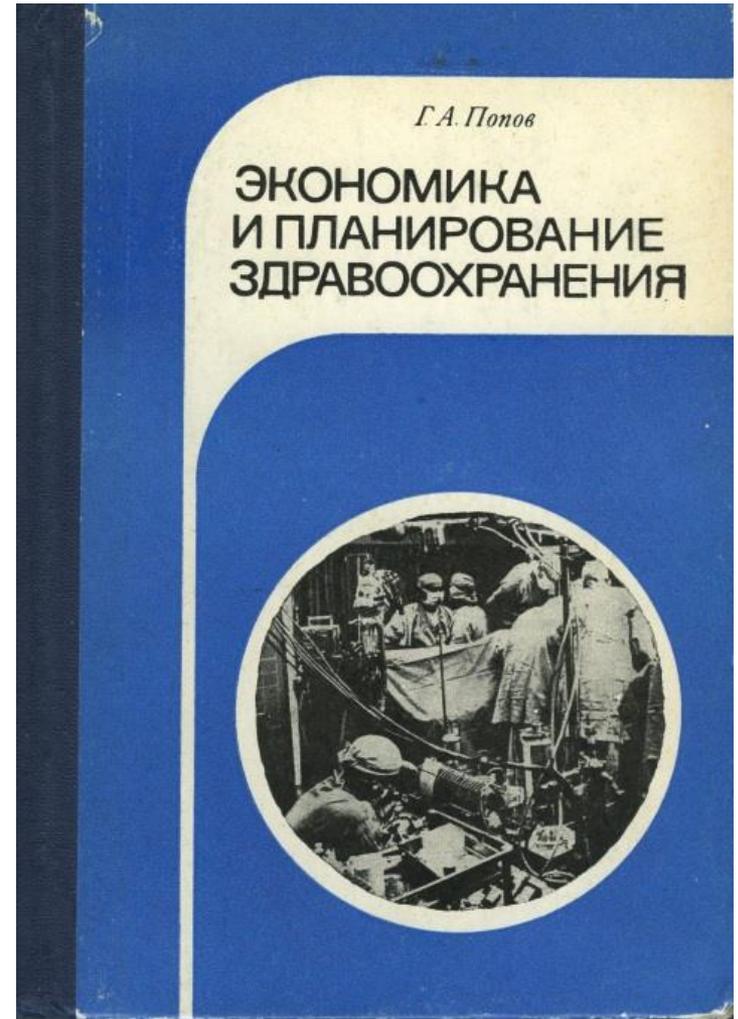
© Christopher Davis 2020. Prepared by author with inspirations from Kornai (1980, Figure 3.1) about tolerance limits and Linkov et al. (2019, Figure 3) about stages of resilience.

Categories of Readiness and Resilience of Health Systems During Covid-19 Epidemics

	Readiness	Resilience
A	Control of the health system: Management structure, health priorities and anti-epidemic planning	Control of the health system: Adaptations of health management and priorities to the Covid-19 epidemic
B	Provision of medical personnel	Mobilisation and management of medical personnel
C	Provision of medical facilities and ICUs	Mobilisation of medical facilities, medical equipment and ICUs
D	Organisation of the medical supply system	Adaptation of the medical supply system and its effectiveness
E	Provision of medical capital equipment	Acquisition and distribution of new medical capital equipment
F	Provision of medicines and medical supplies	Acquisition and distribution of medicines and medical supplies
G	Provision of medical personal protective equipment	Acquisition and distribution of medical personal protective equipment
H	Adequacy of treatment of medical needs of the population (scale of hidden illness in morbidity iceberg)	Adequacy of treatment of medical needs of the population (scale of hidden illness in morbidity icebergs)
I	Adequacy of treatment of medical demands (reported illness) of the population (degree of rationing through waiting lists)	Adequacy of treatment of medical demands (reported illness) of the population (rationing through waiting lists)
J	Domestic industrial capabilities for the production of medicines, medical goods, medical PPE and medical equipment	Mobilisation of domestic industry production of medicines, medical foods, medical PPE and medical equipment
K	Domestic biomedical R&D: Development of medicines, testing kits, vaccines and capacity for lab processing of tests	Mobilisation of domestic biomedical R&D for the development of Covid-19 tests and vaccines and for lab processing of tests
L	Capacity for carrying out tests for infectious diseases, tracing contacts and quarantining the infected	Mobilisation of testing for Covid-19, tracing of contacts of the infected, and quarantining them
M	Medical system performance prior to Covid-19: Achievements and constraints	Medical system performance during Covid-19 epidemics
N	Health outcomes (remain healthy, illness, recovery, mortality)	Health outcomes (remain healthy, illness, recovery, mortality)
O	Residential social care for the elderly and its links with the NHS	Mobilisation of residential social care homes to protect vulnerable residents during Covid-19 epidemics
P	Overall assessment of national readiness for Covid-19 epidemics	Overall assessment of national resilience in coping with Covid-19

C. Davis Empirical Research in USSR/Russia on Health Systems, Morbidity, and Mortality

- USA IREX exchange year (1976-77) at Moscow State University, Department of the Economics of the Non-Productive Sphere
- Supervisor G.A. Popov. Asst. Prof. Lev Jakobson (now Vice-President, HSE)
- CEMI: 1981 and 1982
- RANEPА: 2013-2021
- HSE: 2018-2024



Effort to Fill in the Mortality Matrix of My Model Resulted in my Discovery of Rising Age-Specific Mortality Rates USSR, 1964 - 1976

Age-Specific Mortality Rates¹ (Deaths per 1,000 in the Age Group)

	1964/65	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1975/76 as % of Minimum Since 1964/65
All Ages²	7.1	7.3	7.5	7.7	7.9	8.2	8.2	8.4	8.6	8.7	9.0	9.4	132
0 to 1³	27.2	26.1	26.0	26.4	25.8	24.7	22.9	24.7	26.4	27.9	29.4	31.1	136
0 to 4	7.2	6.9	6.9	7.0	7.0	6.9	6.7	6.8	7.2	7.7	8.2	8.7	130
5 to 9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	100
10 to 14	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	100
15 to 19	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	100
20 to 24	1.6	1.6	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.7	1.7	113
25 to 29	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.1	2.1	2.0	2.1	2.1	105
30 to 34	2.5	2.6	2.6	2.7	2.8	2.8	2.8	2.8	2.8	2.8	3.0	3.0	120
35 to 39	3.1	3.2	3.4	3.5	3.5	3.7	3.8	3.7	3.6	3.6	3.7	3.8	123
40 to 44	3.8	3.9	4.1	4.3	4.6	4.7	4.7	4.8	4.8	4.9	5.2	5.3	140
45 to 49	5.0	5.1	5.3	5.5	5.6	6.0	6.0	6.1	6.2	6.4	6.7	6.9	138
50 to 54	7.8	7.9	7.9	8.0	8.1	8.7	8.7	8.8	8.6	8.8	9.0	9.3	119
55 to 59	10.8	11.1	11.3	11.5	12.1	11.7	11.8	11.9	12.5	12.3	13.0	13.4	124
60 to 64	17.2	17.2	17.4	17.8	18.2	18.0	17.9	18.1	18.0	18.2	18.3	18.9	110
65 to 69	24.4	25.5	25.9	26.3	27.5	27.5	26.9	26.8	27.2	27.0	27.4	28.0	115
70 and Over	64.2	65.8	66.1	66.8	67.3	75.7	74.9	74.8	75.5	73.5	73.3	75.0	117

Notes: (1) ASMR are two-year moving averages; (2) Crude Death Rate: Deaths per 1,000 population; (3) Infant Mortality Rate: Deaths during first year of life per 1,000 live births.

Source: Davis and Feshbach (1980)



Lowest



Highest

Research in Moscow Resulted in One of First Studies of Mortality Problems in the USSR



Rising Infant Mortality in the U.S.S.R. in the 1970's

by
Christopher Davis,
 Centre for Russian
 and East European Studies
 University of Birmingham
 and
Murray Feshbach,
 Foreign Demographic
 Analysis Division.

Series P-95, No. 74
 Issued September 1980

1980



U.S. Department of Commerce
 Philip M. Klutznick, Secretary
 Luther H. Hodges, Jr.,
 Deputy Secretary
 Courtney M. Slater,
 Chief Economist

BUREAU OF THE CENSUS
 Vincent P. Barabba, Director

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**Readiness of the UK and Russia
Health Systems for Covid-19:
Developments During 2000-2019**
[Davis 2020 *PCE1*]

Health Production Process: Illnesses, Medical Care, Priorities, Shortages, Rationing, and Outcomes

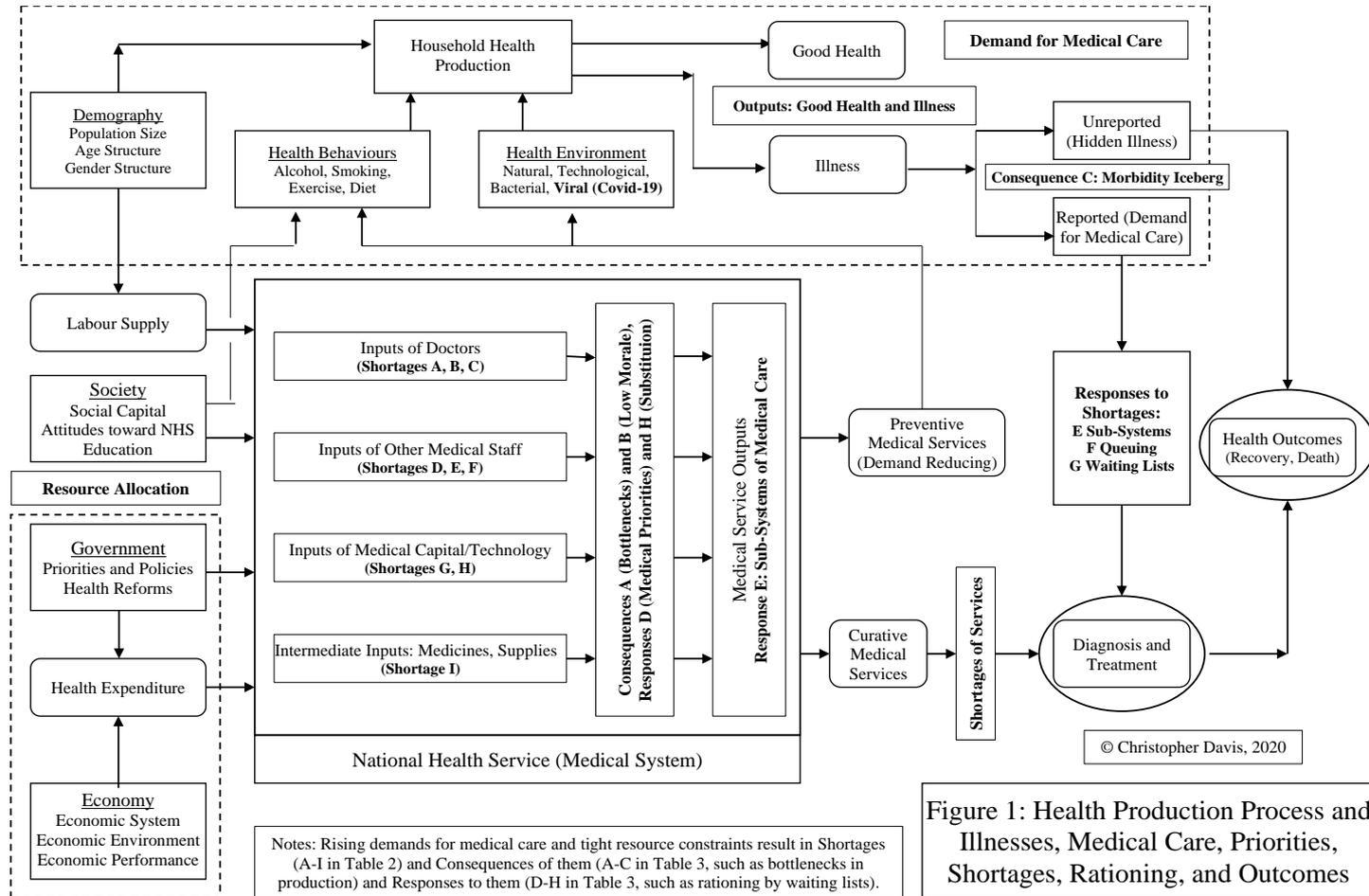


Figure 1: Health Production Process and Illnesses, Medical Care, Priorities, Shortages, Rationing, and Outcomes

Summary of Developments in UK and Russia Health Systems During 2000-2019: 1

- **Demography**: Ageing of population
- **Epidemiology**: Rapid growth of non-communicable diseases (NCD)
- **Demand for Medical Care**: Substantial growth for treatment of NCD
- **Priority** of health lowered after GFC and **Health Spending** growth slows

Summary of Developments in UK and Russia Health Systems During 2000-2019: 2

- **Medical Technology:** Advances, but uneven. Both UK and Russia behind Germany. Need to consider facilities, machinery, medicines, medical inputs
- **Shortages** intensify concerning medical labour, technology, facilities, medicines
- **Consequences of Shortages:** Increases in unreported illness and late diagnoses, pressure on staff, disruption of treatment
- **Responses to Shortages:** Treatment priorities, queuing, waiting lists, substitutions of inputs

Indicator	Source	Units	2000	2005	2007	2008	2009	2010	2013	2014	2015	2017	2018
<i>Factors Influencing Demand for Medical Care</i>													
Population (mid-year)		Millions	58.9	60.4	61.3	61.8	62.3	62.8	64.1	64.6	65.1	66.1	66.3
Elderly Share of Population		% 60 years and older	18.5	17.3	17.1	17.2	17.3	17.5	18.5	18.8	19.1	19.4	19.7
Measles Incidence		New Cases per 100,000	0.2	0.1	1.6	2.3	1.9	0.6	3.0	0.2	0.1	0.4	1.4
Viral Hepatitis Incidence		New Cases per 100,000	13	15	15	15	15	14	13	11	10	9	
Diabetes Mellitus Incidence		New Cases per 100,000					380.6	369.9	258.1	249.1	397.3		
Tuberculosis Incidence		New Cases per 100,000	10.6	13.6	13.1	13.4	13.1	12.6	11.5	10.3	9.1	8.6	8.3
Malignant Neoplasms Incidence	OECD	New Cases per 100,000	461.6	482.2	491.6	506.5	520.2	523.4	551.2	556.8	557.5		
<i>Factors Influencing the Availability of Resources to Support the National Health Service</i>													
GDP in Real Terms	OECD	\$ Billions 2015 PPP	2,125.9	2,443.9	2,573.1	2,565.9	2,456.9	2,504.8	2,636.2	2,704.9	2,768.6	2,875.1	2,913.7
GDP Index	OECD	2000 = 100	100.0	115.0	121.0	120.7	115.6	117.8	124.0	127.2	130.2	135.2	137.1
GDP Annual Growth	OECD	%	3.9	3.2	2.4	-0.3	-4.2	1.9	2.1	2.6	2.4	1.9	1.3
GDP Russia/UK Per Capita	OECD	Ratio	0.95	1.11	1.24	1.31	1.26	1.29	1.35	1.33	1.27	1.25	1.27
Public Health Expenditure	UK	£ Billion Current	49.57	82.93	94.69	102.34	108.75	116.92	124.30	129.39	134.05	142.99	147.34
Public Health Expenditure	UK	Index 2000 = 100 £ BC	100.0	167.3	191.0	206.5	219.4	235.9	250.8	261.0	270.4	287.7	297.2
Public HE Per Capita	UK	£ Current	841.8	1,372.7	1,544.2	1,655.3	1,746.7	1,863.0	1,939.0	2,003.0	2,058.8	2,159.1	2,217.8
Public HE Per Capita	OECD	\$ Current	1,237.7	1,890.4	2,110.9	2,224.5	2,328.8	2,384.9	2,836.9	2,915.2	2,939.6	3,107.1	3,138.5
Public Health Exp Share GDP	OECD	%	4.7	5.9	6.1	6.3	7.1	7.0	7.8	7.8	7.7	7.6	7.5
Public Health Exp Share of GDP	UK	% £ Current	4.6	6.0	6.1	6.5	6.9	7.5	7.2	7.2	7.2	7.1	7.1

Health Production in the UK: 2000-2018 (1)

Indicator	Source	Units	2000	2005	2010	2015	2018
<i>Factors Influencing Demand for Medical Care</i>							
Population (mid-year)		Millions	58.9	60.4	62.8	65.1	66.3
Elderly Share of Population		% 60 years and older	18.5	17.3	17.5	19.1	19.7
Malignant Neoplasms Incidence	OECD	New Cases per 100,000	461.6	482.2	523.4	557.5	
<i>Factors Influencing the Availability of Resources to Support the National Health Service</i>							
GDP Index	OECD	2000 = 100	100.0	115.0	117.8	130.2	137.1
Public HE Per Capita	UK	£ Current	841.8	1,372.7	1,863.0	2,058.8	2,217.8
Public Health Exp Share GDP	OECD	%	4.7	5.9	7.0	7.7	7.5

Health Production in the UK: 2000-2018 (2)

Indicator	Units	2000	2005	2007	2008	2009	2010	2013	2014	2015	2017	2018
<i>Resources and Performance of the National Health Service</i>												
Doctors	Number	116427	144780	152184	158597	164607	166250	173976	177352	180444	185092	188783
Doctors	Per 1,000	2.0	2.4	2.5	2.6	2.6	2.7	2.7	2.8	2.8	2.8	2.9
GPs (Primary Care Doctors)	Number	39,908	44,199	45,362	46,850	49,437	48,641	49,875	50,995	50,169	49,824	49,569
Nurses and Midwives	Number	506,537	581,718	560,044	565,550	559,411	557,747	540,205	544,080	546,220	548,498	548,500
Nurses and Midwives	Per 1,000	8.6	9.0	8.1	8.2	8.0	8.0	8.4	8.4	8.4	8.3	8.3
Ratio Nurses/Midwives to Doctors	Number	4.3	4.2	3.7	3.6	3.4	3.4	3.1	3.1	3.0	3.0	2.9
GP Consultations	Millions	266	242	251	266	287	289	295	304	306	304	307
GP Visits Per Year Per Capita	Visits	4.0	4.0	4.1	4.3	4.6	4.6	4.6	4.7	4.7	4.6	4.6
GP Average Patient List Size	Number	1,779	1,887	1,974	1,958	1,903	1,942	1,944	1,999	1,953	1,999	1,721
Hospital Beds	Thousands	240.1	224.9	207.8	206.0	203.3	183.8	178.8	176.3	170.0	167.6	
Hospital Beds	Per 1,000	4.1	3.7	3.4	3.3	3.3	2.9	2.8	2.7	2.6	2.5	
Hospital Bed Occupancy	% Available Beds	83	84	84	84	84	85					
Length of Stay in Hospital	Ave number of days		8.1	8.0	7.8	7.7	7.2	7.1	7.1	7.1	6.9	
Wait Time for Treatment after Specialist Assessment	% more than three months			18.5	17.2	23.2	29.5	29.8	28.4	31.9		
Surgery: Coronary Artery Bypass	Number	25,127	23,412	22,385	21,123	19,245	18,013	17,030	16,958	16,166	14,731	14,187
Computerised Tomography Scanners	Per million population	5.4	7.5	7.9	9.5	9.8						
Magnetic Resonance Imagers	Per million population	5.6	5.4	6.6	7.2	8.0						

Indicator	Units	2000	2005	2010	2015	2018
<i>Resources and Performance of the National Health Service</i>						
Doctors	Per 1,000	2.0	2.4	2.7	2.8	2.9
Nurses and Midwives	Per 1,000	8.6	9.0	8.9	8.4	8.3
GP Visits Per Year Per Capita	Visits	4.0	4.0	4.6	4.7	4.6
Hospital Beds	Per 1,000	4.1	3.7	2.9	2.6	
Wait Time for Treatment after Specialist Assessment	% more than three months			23.2	28.4	
Computerised Tomography Scanners	Per million population	5.4	7.5	7.9	9.5	9.8
Magnetic Resonance Imagers	Per million population	5.6	5.4	6.6	7.2	8.0
<i>Health Outcomes: Mortality-Related</i>						
Crude Death Rate	Deaths per 1,000	10.3	9.7	8.9	9.3	9.3
Maternal Mortality	Deaths per 100,000 Births	7.0	5.7	5.0	4.5	
Infant Mortality	Deaths per 1,000 Births	5.5	5.1	4.2	3.9	3.9
Population Life Expectancy at Birth	Years	77.9	79.2	80.6	81.0	
Male Life Expectancy at Birth	Years	75.5	76.9	78.6	79.2	

Health Production in Russia: 2000-2018 (1)

Indicator	Units	2000	2003	2005	2007	2008	2009	2010	2015	2018
Factors Influencing Demand for Medical Care										
Population (end-year)	Millions	146.3	144.2	143.2	142.8	142.8	142.7	142.9	146.5	146.9
Elderly share of population	% 60 and older	18.3	18.3	17.3	17.1	17.2	17.4	17.7	19.9	21.3
Total illnesses	New cases/100,000	73,573	74,857	74,588	77,100	77,200	80,246	78,004	77,816	78,213
Acute intestinal infections	New cases/100,000	517	433	442	479	478	490	569	520	782
Viral Hepatitis	New cases/100,000	163	98	93	73	71	70	66	56	47
Acute infections of the upper respiratory tract	New cases/100,000	20,352	19,859	18,674	19,480	19,336	23,407	19,778	20,452	30,816
Diabetes Mellitus	New cases/100,000	112	149	174	213	213	218	227	241	252
Tuberculosis	New cases/100,000	95	88	84	83	85	83	77	58	44
Malignant Neoplasms	New cases/100,000	310	317	331	342	346	356	362	403	426
Circulatory illness	New cases/100,000	1,718	2,060	2,290	2,617	2,663	2,651	2,614	3,117	3,258
Factors Influencing the Availability of Resources to Support the NHS										
GDP in real terms (OECD)	\$ Billions 2015 PPP	2019	2385	2719	3191	3359	3096	3236	3526	3689
GDP index (OECD)	2000=100	100.0	118.1	134.7	158.1	166.4	153.3	160.3	174.6	182.7
GDP annual growth	%	10.1	7.3	6.4	8.5	5.2	-7.8	4.5	-2.0	2.5
GDP Russia/UK	Ratio	0.95	1.03	1.11	1.24	1.31	1.26	1.29	1.27	1.27
Public health expenditure (HE) index	Real 1991 = 100	64.0	76.0	79.0	100.0	122.0	120.0	124.0	141.0	148.0
Public health expenditure (HE) index	Real 2000 = 100	100.0	118.8	123.4	156.3	190.6	187.5	193.8	220.3	231.9
Public HE share of state budget	%	12.4	11.0	11.7	12.1	11.1	10.3	9.7	9.6	9.7
Public HE per capita (OECD)	\$ Current	265	342	431	613	753	751	740	837	942
Public HE share GDP (OECD)	%	3.0	3.0	2.9	2.9	3.1	3.5	3.0	3.1	3.2
Public HE Share GDP (Russia)	%	3.3	3.5	3.7	4.2	3.7	4.3	3.8	3.4	3.2
Pharmacy sales index	2007=100 Rubles	22.0	36.9	64.7	100.0	126.7	167.0	179.8	332.1	344.7
Imports of medicines	Millions \$	1,154	2,078	3,865	5,550	7,513	7,136	9,346	6,876	8,095
Imports of medicines index	\$ 2007=100	20.8	37.4	69.6	100.0	135.4	128.6	168.4	123.9	145.9
Imports of medical equipment	Millions \$	481	1,042	1,239	3,295	4,419	3,032	3,468	2,634	3,385

Indicator	Units	2000	2005	2010	2015	2018
Factors Influencing Demand for Medical Care						
Population (end-year)	Millions	146.3	143.2	142.9	146.5	146.9
Elderly share of population	% 60 and older	18.3	17.3	17.7	19.9	21.3
Malignant Neoplasms	New cases/100,000	310	331	362	403	426
Factors Influencing the Availability of Resources to Support the NHS						
GDP index (OECD)	2000=100	100.0	134.7	160.3	174.6	182.7
Public health expenditure (HE) index	Real 1991 = 100	64.0	79.0	124.0	141.0	148.0
Public health expenditure (HE) index	Real 2000 = 100	100.0	123.4	193.8	220.3	231.9
Public HE share GDP (OECD)	%	3.0	2.9	3.0	3.1	3.2

Health Production in Russia: 2000-2018 (2)

Indicator	Units	2000	2003	2005	2007	2008	2009	2010	2013	2014	2015	2018
Resources and Performance of the NHS												
Total Russian NHS employment	Thousands	4,503	4672.0	4,453	4,644	4,666	4,638	4,631	4,523	4,496	4,496	4,484
Doctors	Thousands	680	686	690	707	704	711	716	703	709	673	704
Doctors	Per 1,000 population	4.7	4.8	4.9	5.0	5.0	5.0	5.0	4.9	4.9	4.6	4.8
Middle medical personnel	Thousands	1,564	1,552	1,530	1,543	1,511	1,518	1,509	1,519	1,525	1,550	1,491
Middle medical personnel	Per 1,000 population	10.8	10.9	10.8	10.8	10.9	10.7	10.6	10.6	10.4	10.6	10.2
MMP per doctor	Number	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.3	2.1
Polyclinics	Number	21,254	21,467	21,783	18,301	15,625	15,322	15,732	16,461	17,106	18,564	20,228
Outpatient doctor visits per year	Total million	1,313	1,286	1,264	1,309	1,329	1,343	1,333	1,358	1,323	1,289	1,231
Outpatient doctor visits per year	Per person	9.0	8.9	8.8	9.1	9.3	9.2	9.2	9.5	9.2	9.0	8.4
Hospital beds	Number	10,704	10,101	9,479	6,777	6,545	6,454	6,308	5,870	5,638	5,453	5,257
Hospital beds	Thousands	1,672	1,597	1,575	1,522	1,399	1,373	1,340	1,302	1,267	1,222	1,173
Hospital beds	Per 1,000 population	11.6	11.1	11.1	10.7	9.9	9.7	9.4	9.1	8.7	8.3	8.0
Length of stay in hospital	Bed days per patient	15.5	14.5	13.8	13.2	13.1	12.8	12.6	12.1	11.8	11.5	10.7
Operations in hospitals rate	Per 1,000 population	59.4	59.3	61.5	61.4	62.6	64.5	64.9	66.2	66.7	67.5	68.3
CAT scanners	Per million population	2.6	3.0	3.8	4.4	5.0	6.0	6.9	11.3	12.2	12.6	13.6

Indicator	Units	2000	2005	2010	2015	2018
Resources and Performance of the NHS						
Doctors	Per 1,000 population	4.7	4.9	5.0	4.6	4.8
Middle medical personnel	Per 1,000 population	10.8	10.8	10.6	10.6	10.2
Polyclinics	Number	21,254	21,783	15,732	18,564	20,228
Outpatient doctor visits per year	Per person	9.0	8.8	9.3	9.0	8.4
Hospital beds	Per 1,000 population	11.6	11.1	9.4	8.3	8.0
Length of stay in hospital	Bed days per patient	15.5	13.8	12.6	11.5	10.7
Operations in hospitals rate	Per 1,000 population	59.4	61.5	64.9	67.5	68.3
CAT scanners	Per million population	2.6	3.8	6.9	12.6	13.6
Magnetic resonance imagers	Per million population	1.1	1.5	2.5	4.6	4.9
Health Outcomes: Mortality-Related						
Crude death rate	Deaths per 1,000	15.3	16.1	14.2	13.0	12.5
Maternal mortality	Deaths per 100,000 births	40.0	25.4	16.5	10.1	9.1
Infant mortality	Deaths per 1,000 births	16.6	11.0	7.5	6.5	5.1
Population life expectancy at birth	Years	65.3	65.7	68.9	71.4	72.9
Male life expectancy at birth	Years	59.0	58.9	63.1	65.9	67.8



Basic Technical Standards in Hospitals and Polyclinics in Russia, 1995--2018

	1995	2000	2007	2018
Hospitals				
All Hospitals, Thousands	27.0	24.8	23.0	11.0
The share of hospitals that lack, as a % of the total:				
supply of running hot water	39.5	35.5	30.6	16.6
central heating	14.7	10.1	8.4	8.2
sewerage	18.7	13.2	10.2	4.4
telephone connection	10.5	9.9	5.9	5.2
Outpatient Facilities with Doctors (e.g. Polyclinics)				
All Outpatient, Thousands	19.7	19.9	19.1	20.1
The share of outpatient facilities that lack, as a % of the total:				
supply of hot water	44.1	42.9	38.6	26.2
central heating	16.3	14.3	11.9	13.2
sewerage	22.6	18.2	14.5	6.9
telephone connection	9.0	8.7	7.2	5.3

Changing Priority of UK NHS: 2000-2007 versus 2008-2019

		2000-2007	2008-2019
Indicators of Priority Status of NHS		Economic System	
		Decentralised Capitalist	Decentralised Capitalist
		High Priority	Medium-Low Priority
		Summary of Evidence Concerning Priority Indicators	
<i>During Plan/Budget Formulation</i>			
A	Health in Leadership's Objective Function (OF)	High Weight in OF: Health was Key Programs, so Preferential Allocation of Resources	Medium Weight in OF: NHS allocation "ing-downed" but Low Growth of Real Health Spending
B	Resource Allocation Responsiveness to Problems	Usually Responsive	Slow and Lagged Responses
C	Wage Rates	Relatively High, Especially for Doctors	Austerity Policies Involve Wage Controls (-1.2% annual growth)
D	Adequacy of Financial Norms in Budgets	Generous	Moderate
<i>During Plan/Budget Implementation</i>			
E	Output Plans	Ambitious Targets, Regular interventions to help meet them	Ambitious Targets to be attained through
F	Budget Constraints	Relatively Soft	
G	Supply Plans	Generous budgets enable no necessary supplies	
H	Siphoning of Supplies	High priority protects NHS fr siphoning, but internal eq according to medical pt	
I	Investment Plans	Ambitious Plans and Cost They Fulfillment	
J	Inventories of Inputs	Adequate input invent	
K	Reserve Production Capacity	Adequate	
L	Shortage Intensity	Low	

Indicators of Priority Status of NHS

2000-2007

2008-2019

Economic System

Decentralised Capitalist

Decentralised Capitalist

High Priority

Medium-Low Priority

Summary of Evidence Concerning Priority Indicators

During Plan/Budget Formulation

A Health in Leadership's Objective Function

High Weight in OF

Low Weight in OF

B Resource Allocation Responsiveness to Problems

Usually Responsive

Slow and Lagged Responses

During Plan/Budget Implementation

F Budget Constraints

Relatively Soft

Relatively Hard

J Inventories of Inputs

Adequate input inventories

Low Input Inventories

L Shortage Intensity

Low

Rising to High.

Changing Priority of Russia NHS: 2000-2007 versus 2008-2019

Row	Indicators of Priority Status of NHS	2000-2007	2008-2019
		Economic System	Economic System
		State Capitalist Economy	State Capitalist Economy
		Medium Priority (with High)	Low Priority (with High)
		Summary of Evidence Concerning Indicators	
<i>During Plan/Budget Formulation</i>			
A	Health in Leadership's Objective Function (OF)	Somewhat High Weight in OF, but acceptance of Trade-Offs between Health and Other Objectives.	Medium Weight in OF. Trade-Offs between Health and Other Objectives.
B	Resource Allocation Responsiveness to Problems	More Responsive than in the past	Slow and Lagged Responses
C	Wage Rates and Labour Conditions	Real wages increase, but remain relatively low. Work conditions improve.	High priority given to raising wages of doctors, but not other personnel. Work conditions deteriorate.
D	Adequacy of Financial Norms in Budgets	More Generous than in the past	Moderate
<i>During Plan/Budget Implementation</i>			
E	Output Plans	Reasonably Strong Commitment to Fulfillment of Plans	Adequate Commitment to Fulfillment of Plans
F	Budget Constraints	Softer than in past	Somewhat Hard
G	Supply Plans	Reasonably Strong Commitment to Fulfillment of Plans	Moderate Commitment to Fulfillment of Plans
H	Siphoning of Supplies	High priority external siphoning according to medical priorities	
I	Investment Plans	Ambitious Plan Commitment to	
J	Inventories of Inputs	Improved Input	
K	Reserve Production Capacity	Adequate	
L	Shortage Intensity	Lower than in past	

Row	Indicators of Priority Status of NHS	2000-2007	2008-2019
		Economic System	
		State Capitalist Economy	State Capitalist Economy
		Medium Priority (with High)	Low Priority (with High)
		Summary of Evidence Concerning Indicators	
<i>During Plan/Budget Formulation</i>			
B	Resource Allocation Responsiveness to Problems	More Responsive than in the past	Slow and Lagged Responses
C	Wage Rates and Labour Conditions	Real wages increase, but remain relatively low. Work conditions improve.	High priority given to raising wages of doctors, but not other personnel. Work conditions deteriorate.
<i>During Plan/Budget Implementation</i>			
F	Budget Constraints	Softer than in past	Somewhat Hard
H	Siphoning of Supplies	High priority protects NHS from external siphoning, but internal siphoning according to medical priorities	NHS mostly protected from external siphoning, but internal siphoning according to medical priorities
J	Inventories of Inputs	Improved Input Inventories	Reduced Input Inventories
K	Reserve Production Capacity	Adequate	Limited
L	Shortage Intensity	Lower than in past	Rising to High.

Consequences of Shortages in UK NHS: 2000-2019

Row	Descriptions of Consequence or Policy Response	2000-2007	2008-2019
		Summaries of Empirical Evidence	
Consequences of Shortages			
A	Shortages Cause Bottlenecks in Production of Medical Services	This phenomenon was reduced in importance in the NHS due to the substantial allocation of additional resources and reductions in shortages.	The tightening of resource constraints due to austerity and the greater intensity of shortages generated more bottlenecks in the production of medical services in the NHS.
B	Shortages Increase Stress and Lower Motivation of Medical Personnel	The improvements in resources resulted in reduced shortages, complaints by patients, and levels of stress of medical staff. Motivation of personnel increased, as did their medical performances.	The constraints on resources increased shortages, complaints by patients, and levels of stress of medical staff. Motivation of personnel declined, as did their medical performances and commitments to the NHS.
C	Shortages Cause Under Reporting of Illnesses, Increasing the Hidden Components of Morbidity Icebergs	The reductions of shortages of medical staff, queuing, and waiting times encouraged people to report illnesses to the NHS in a timely manner. So the hidden components of the "morbidity iceberg" was reduced.	Increased shortages of medical staff, queuing, and waiting times discouraged people from reporting illnesses to the NHS in a timely manner. So the hidden components of the "morbidity iceberg" increased.
Policy Responses to Shortages			
D	Revision of Priorities	Renewed emphasis on preventive measures to improve health-related behaviours; uncovering hidden serious illnesses (e.g. cancer) earlier; improving technical standards of medical care.	Tighter financial constraints force NHS to focus resources on infants, pregnant women, life-threatening illnesses given lower priority.
E	Rationing by Socio-Political Criteria (Sub-Systems of Medical Care)	No significant changes in structures. Priorities become more flexible due to greater resources.	No major changes in structures of private medical care. Priorities governing of care became firmer due to resource constraints.
F	Rationing by Queuing	Patients wait less in physical queues at GP surgery and A&E departments at hospital. Development of GP queues by appointments. Overall reduction in queuing due to greater resources.	Shift in queuing at GP practices from physical queues to queues for appointments. Worsening of physical queues in A&E departments at hospital. Reduced achievement of waiting time targets. Queuing on trolleys for beds.
G	Rationing by Waiting List	Extra resources reduce sizes of waiting lists and average waiting time related to rationing of access of patients to: specialized outpatient diagnosis, admission to hospital for diagnosis, operations and treatments following diagnosis.	Restrictions on resources increase sizes of waiting lists and waiting times related to rationing of access to: outpatient diagnosis, inpatient hospital diagnosis, operations and treatments following diagnosis.
H	Exclusion of Types of Medical Services from State Guarantee	Due to improved availability of resources NHS makes minimal adjustments to "state guarantee" to eliminate types of medical services.	Due to tightening resource constraints NHS re-evaluates its guarantees and eliminates many traditional medical services due to their inappropriate nature and ineffectiveness.
I	Substitution of Traditional Inputs (Doctors, Medicines) by Cheaper Inputs	UK continues past efforts to substitute labour of doctors with that of nurses and medical assistants. Greater use of generic medicines for more expensive branded drugs.	Intensified efforts to re-evaluate traditional medical services of inappropriate nature and ineffectiveness. Substitution of high-cost

Row	Descriptions of Consequence or Policy Response	2000-2007	2008-2019
		Summaries of Empirical Evidence	
Consequences of Shortages			
A	Shortages Cause Bottlenecks in Production of Medical Services	This phenomenon was reduced in importance in the NHS due to the substantial allocation of additional resources and reductions in shortages.	The tightening of resource constraints due to austerity and the greater intensity of shortages generated more bottlenecks in the production of medical services in the NHS.
C	Shortages Cause Under-Reporting of Illnesses, Increasing the Hidden Components of Morbidity Icebergs	The reductions of shortages of medical staff, queuing, and waiting times encouraged people to report illnesses to the NHS in a timely manner. So the hidden components of the "morbidity iceberg" was reduced.	Increased shortages of medical staff, queuing, and waiting times discouraged people from reporting illnesses to the NHS in a timely manner. So the hidden components of the "morbidity iceberg" increased.
Policy Responses to Shortages			
D	Revision of Priorities	Renewed emphasis on: preventive measures to improve health-related behaviours; uncovering hidden serious illnesses (e.g. cancer) earlier; improving technical standards of medical care.	Tighter financial constraints and shortages force NHS to focus resources on infants, pregnant women, life-threatening illnesses. Normal illnesses given lower priority.
F	Rationing by Queuing	Patients wait less in physical queues at GP surgery and A&E departments at hospital. Development of GP queues by appointments. Overall reduction in queuing due to greater resources.	Shift in queuing at GP practices from physical queues to queues for appointments. Worsening of physical queues in A&E departments at hospital, which practice triage. Reduced achievement of waiting time targets. Queuing on trolleys for beds.
G	Rationing by Waiting List	Extra resources reduce sizes of waiting lists and average waiting time related to rationing of access of patients to: specialized outpatient diagnosis, admission to hospital for diagnosis, operations and treatments following diagnosis.	Restrictions on resources increase sizes of waiting lists and waiting times related to rationing of access to: outpatient diagnosis, inpatient hospital diagnosis, operations and treatments following diagnosis.
H	Exclusion of Types of Medical Services from State Guarantee	Due to improved availability of resources NHS makes minimal adjustments to "state guarantee" to eliminate types of medical services.	Due to tightening resource constraints NHS re-evaluates its guarantees and eliminates many traditional medical services due to their inappropriate nature and ineffectiveness.

Shortages in the Russia NHS 2000-2019

Row	Category of Shortage	Russia NHS 2000-2007	Russia NHS 2008-2019	Russia NHS 2000-2007	Russia NHS 2008-2019
		Summary of Empirical Evidence about the Intensity of Shortages in Russia			
A	Doctors: National Shortages	High provision of doctors by world standards (5.0/1000 in 2007). National shortages relative to established positions. Improved performances due to greater resources and higher wages.	High provision of doctors by world standards (4.8/1000 in 2017). National shortages relative to established positions. Improved morale and performances due to substantial pay increases.		
B	Doctors: Shortages in Rural Areas and Deprived Regions	High provision of doctors in cities and improved circumstances in rural areas and deprived regions.	Growth of shortages of doctors in rural areas and backward regions due to economic crises, poor living conditions, and weak incentives.		
C	Doctors: Shortages of Specialists	Improvements in wages, supplies and equipment result in reductions in shortages in specialties and in high technology fields.	Improvements in wages and equipment reduce shortages in some specialties. But there were deficits of 25,000 doctors in polyclinics and 2,000 oncologists in NHS clinics.		
D	Middle Medical Personnel (MMP): National Shortages	High provision of MMP (10.9/1000 in 2007). Their performances improved due to rises in wages and improved work conditions. Slight fall in ratio of doctors.	Many MMP (10.4/1000 in 2017), but deteriorating work conditions and continued low wages contributed to national shortages relative to positions. Low ratio of MMP to doctors.		
E	MMP: Shortages in Rural Areas and Deprived Regions	Minor improvements in provision of MMP in rural areas and despite financial incentives remain.	MMP occupy fewer doctor positions in rural areas and deprived regions.		
F	MMP: Shortages of Specialists	Improvements in supply of specialist MMP, but continuing deficits in technology medical fields.			
G	Shortages of Medicines and Medical Inputs	Greater resources enabled three-fold increase in imports of medical products (e.g. disposable items). Uneven recovery of domestic production of medicines. Overall, a reduction in shortages.	Increased shortages of medicines due to stagnant domestic production and 32% drop of imports by 2018. Growing deficits of the most modern medical products.		
H	Shortages of Medical Equipment	Greater resources enabled doubling of imports of medical equipment. Increased investment in capital stock of domestic industry and recovery of production of some equipment and spare parts.	Acceleration of obsolescence of medical equipment due to low investment and cuts in imports. Chronic shortages of imported spare parts and material inputs.		
I	Shortages of Hospital Facilities and Beds	Greater investment improves and quality of NHS capital stock. Declines in numbers of hospital and polyclinics improve efficiency. Cause problems in rural areas.			
J	Shortages of Outpatient Facilities				
K	Shortages in Emergency Care	Greater investment improves emergency hospitals, clinics and ambulances. Stability in their relative to patients.			

Consequences of Shortages in Russia NHS: 2000-2019

Row	Descriptions of Consequence or Policy Response	2000-2007	2008-2019
Summaries of Empirical Evidence			
Consequences of Shortages			
A	Shortages Cause Bottlenecks in Production of Medical Services	This phenomenon was reduced in importance in the NHS from Soviet times due to the substantial allocation of additional resources and reduction in shortages.	The tightening of resource constraints due to austerity and the greater intensity of shortages generated more bottlenecks in the production of medical services in the NHS.
B	Shortages Increase Stress and Lower Motivation of Medical Personnel	The improvements in resources resulted in reduced shortages, complaints by patients, and levels of stress of medical staff. Motivation of personnel increased, as did their medical performances.	The constraints on resources increased shortages, complaints by patients, and levels of stress of medical staff. Motivation of personnel declined, as did their medical performances and commitments to the NHS.
C	Shortages Cause Under-Reporting of Illnesses, Increasing the Hidden Components of Morbidity keberg	The reductions of shortages of medical staff, opening, and waiting times encouraged people to report illnesses to the NHS in a timely manner. So the hidden components of the "shadowy iceberg" was reduced.	Increased shortages of medical staff and equipment opening and waiting times discouraged people from reporting illnesses to the NHS in a timely manner. So the hidden components of the "iceberg" increased.
Policy Responses to Shortages			
D	Revision of Priorities	Reviewed emphasis on preventive measures to improve health-related behaviours, increasing hidden services (e.g. cancer earlier), improving technical standards of medical care.	Tighter financial control over NHS to focus pregnant women, life Normal illnesses give
E	Rationing Through Sub-Systems of Medical Care	Russia maintained six sub-systems of medical care: elite, ministerial, industrial, large city, provincial city, and rural district. The initial three were "closed" and gave treatment only to eligible groups.	No significant change treatment within sub-
F	Rationing by Queuing	Reduced waiting time of patients in physical queues at polyclinics, in ambulances for hospital admission, and on trolleys in hospitals for beds. Development of polyclinic queues by appointments.	Gradual shift in queuing in polyclinics from physical queues to waits for appointments. Worsening of ambulance and hospital queues. Reduced achievement of waiting time targets.
G	Rationing by Waiting List	Extra resources reduce sizes of waiting lists and average waiting time related to rationing of access of patients to specialized outpatient diagnosis, admission to hospital for diagnosis and treatments.	Restrictions on resources increase sizes of waiting lists and waiting times related to rationing of access to: outpatient diagnosis, inpatient hospital diagnosis and treatments.
H	Exclusion of Types of Medical Services from State Guarantee	Due to improved availability of resources NHS makes minimal adjustments to "State Guarantees" to eliminate types of medical services.	Due to tightening resources to guarantee traditional medical care inappropriate nature
I	Forced Substitution of Usual Inputs (Doctors, Medicines) by Cheaper Inputs	Despite reduced shortage, NHS tries to substitute labour of doctors with that of nurses and medical assistants. Greater use of generic medicines for more expensive branded and imported drugs.	Intensified efforts to substitute doctors with staff. New efforts by based advice sites. 5 medicines by cheaper

Consequences of Shortages			
A	Shortages Cause Bottlenecks in Production of Medical Services	This phenomenon was reduced in importance in the NHS from Soviet times due to the substantial allocation of additional resources and reductions in shortages.	The tightening of resource constraints due to austerity and the greater intensity of shortages generated more bottlenecks in the production of medical services in the NHS.
B	Shortages Increase Stress and Lower Motivation of Medical Personnel	The improvements in resources resulted in reduced shortages, complaints by patients, and levels of stress of medical staff. Motivation of personnel increased, as did their medical performances.	The constraints on resources increased shortages, complaints by patients, and levels of stress of medical staff. Motivation of personnel declined, as did their medical performances and commitments to the NHS.
Policy Responses to Shortages			
E	Rationing Through Sub-Systems of Medical Care	Russia maintained six sub-systems of medical care: elite, ministerial, industrial, large city, provincial city, and rural district. The initial three were "closed" and gave treatment only to eligible groups.	No significant changes, although priorities of treatment within sub-systems became firmer.
F	Rationing by Queuing	Reduced waiting time of patients in physical queues at polyclinics, in ambulances for hospital admission, and on trolleys in hospitals for beds. Development of polyclinic queues by appointments.	Gradual shift in queuing in polyclinics from physical queues to waits for appointments. Worsening of ambulance and hospital queues. Reduced achievement of waiting time targets.
G	Rationing by Waiting List	Extra resources reduce sizes of waiting lists and average waiting time related to rationing of access of patients to specialized outpatient diagnosis, admission to hospital for diagnosis and treatments.	Restrictions on resources increase sizes of waiting lists and waiting times related to rationing of access to: outpatient diagnosis, inpatient hospital diagnosis, and treatments in hospitals and specialised clinics.
I	Forced Substitution of Usual Inputs (Doctors, Medicines) by Cheaper Inputs	Despite reduced shortage, NHS tries to substitute labour of doctors with that of nurses and medical assistants. Greater use of generic medicines for more expensive branded and imported drugs.	Intensified efforts to replace labour of expensive doctors with that of cheaper medical staff. New efforts by NHS to promote web-based advice sites. Substitution of high-cost medicines by cheaper alternatives.

Ratings of Readiness of the UK and Russia Health Systems: First and Second Waves of Covid-19

Category of Readiness	UK				Russia			
	First Wave		Second Wave		First Wave		Second Wave	
	Rating	Points	Rating	Points	Rating	Points	Rating	Points
A. Control of the health system: Management structure, health priorities and anti-epidemic planning.	<i>Substandard.</i>	2	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3
B. Provision of medical personnel.	<i>Substandard.</i>	2	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3
C. Provision of medical facilities and ICUs.	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3
D. Organisation of the medical supply system.	<i>Substandard.</i>	2	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3
E. Provision of medical capital equipment.	<i>Substandard.</i>	2	<i>Average.</i>	3	<i>Substandard.</i>	2	<i>Average.</i>	3
F. Provision of medicines and medical supplies.	<i>Substandard.</i>	2	<i>Average.</i>	3	<i>Substandard.</i>	2	<i>Average.</i>	3
G. Provision of medical personal protective equipment.	<i>Substandard.</i>	2	<i>Average.</i>	3	<i>Poor.</i>	1	<i>Substandard.</i>	2
H. Adequacy of treatment of medical needs of the population (morbidity iceberg including hidden illness).	<i>Substandard.</i>	2	<i>Average.</i>	2	<i>Poor.</i>	1	<i>Substandard.</i>	2
I. Adequacy of treatment of medical demands (reported illness) of the population (degree of rationing through queuing and waiting lists).	<i>Substandard.</i>	2	<i>Average.</i>	2	<i>Substandard.</i>	2	<i>Average.</i>	2
J. Domestic industrial capabilities for the production of medicines, medical goods, medical PPE and medical equipment.	<i>Average.</i>	3	<i>Good.</i>	4	<i>Average.</i>	3	<i>Good.</i>	4
K. Domestic biomedical R&D: Development of medicines, testing kits, vaccines and capacity for lab processing of tests.	<i>Average.</i>	3	<i>Good.</i>	4	<i>Average.</i>	3	<i>Good.</i>	4
L. Capacity for carrying out tests for infectious diseases, tracing contacts and self-isolating of the infected.	<i>Poor.</i>	1	<i>Substandard.</i>	2	<i>Substandard.</i>	2	<i>Average.</i>	2
M. Medical system performance prior to Covid-19.	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3
N. Health outcomes prior to Covid-19 (Remain Healthy, Illness, Recovery, Mortality)	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3
O. Residential social care for the elderly and its links with the NHS.	<i>Substandard.</i>	2	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3
P. Overall assessment of Readiness of the national health system.	<i>Substandard.</i>	2.3	<i>Average.</i>	2.9	<i>Substandard.</i>	2.5	<i>Average.</i>	2.9

Resilience of UK and Russia Health Systems During Covid-19 Epidemic

[Davis 2021 PCE2]

National Health Production Process During Covid-19 Epidemics

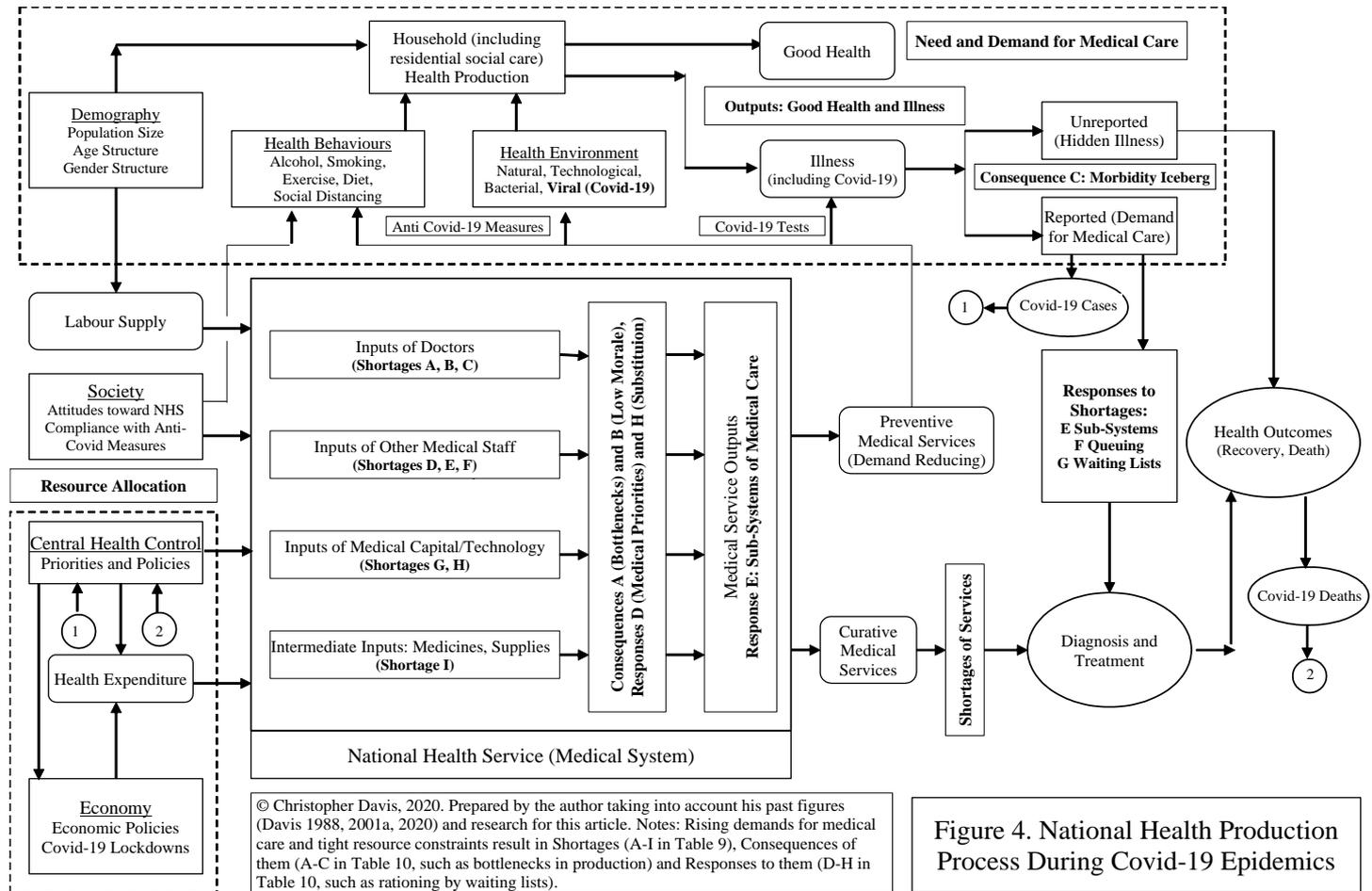


Figure 4. National Health Production Process During Covid-19 Epidemics

Summary of Developments in UK and Russia Health Systems During 2020-2021: 1

- **Demography:** High share of elderly in population, who are most vulnerable to Covid-19
- **Epidemiology:** Unexpected rapid growth of infectious disease (Covid-19)
- **Demand for Medical Care:** Substantial growth for treatment of Covid-19, reduced demand for traditional medical services due to fear of infection and restrictions of supply

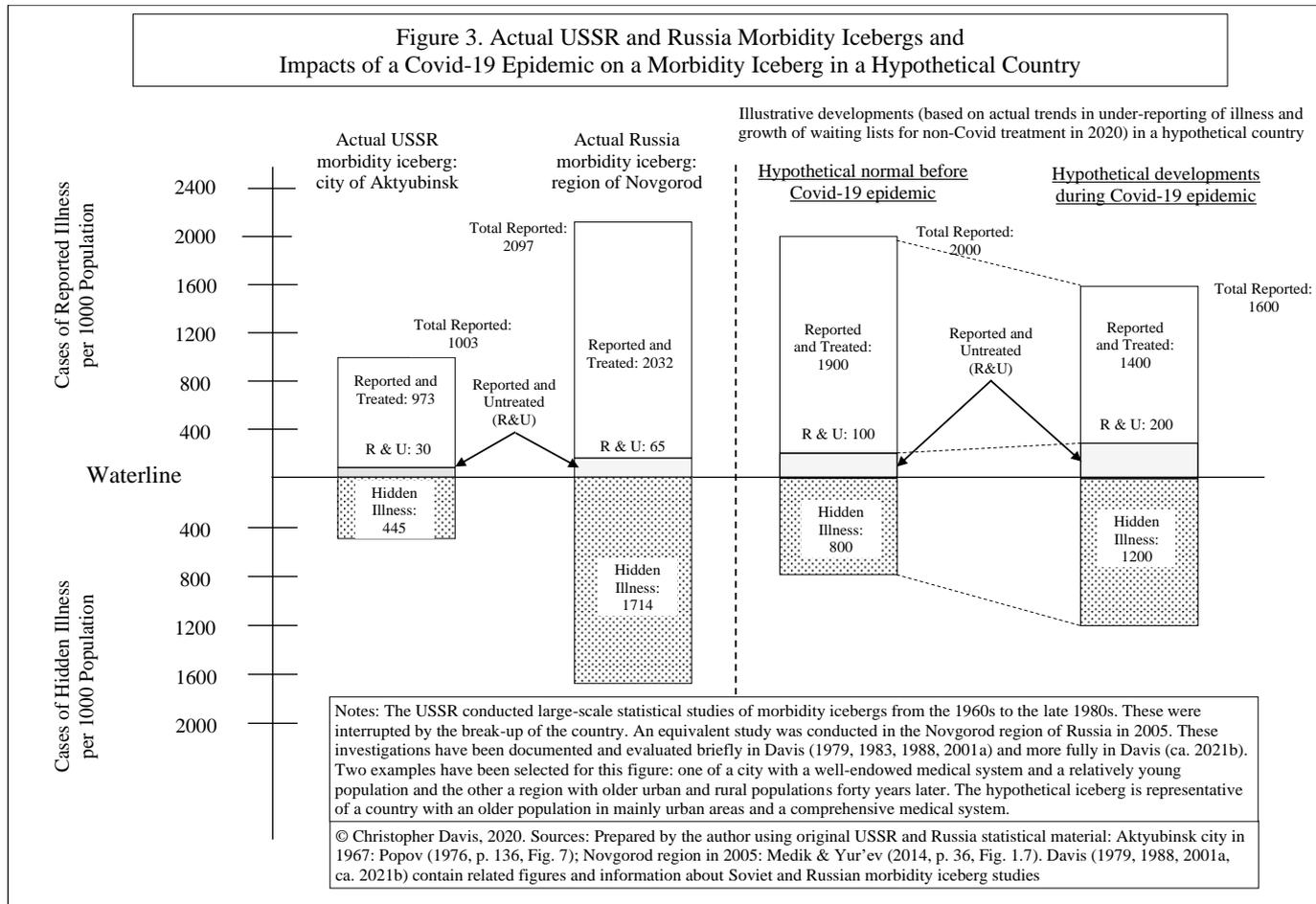
Summary of Developments in UK and Russia Health Systems During 2020-2021: 2

- **Priority** of health raised in general, budget constraints are softened and health spending increases (excess demand). But radical shift in priorities related to treatment, with infectious disease highest, NCD lower, and basic services restricted.
- **Medical Technology:** UK and Russia health systems have deficient technological standards in general and were not prepared for severe and sustained epidemics of infectious disease. This was reflected in deficiencies in facilities, technology (e.g. ventilators), medical inputs (e.g. PPE), medicines, and vaccines. Substantial improvements over time.

Summary of Developments in UK and Russia Health Systems During 2020-2021: 3

- **Shortages** abruptly intensify in 2019 concerning medical labour (respiratory doctors, nurses) technology (ventilators), facilities (building unsuitable for treating patients with infectious illnesses, medicines)
- **Consequences of Shortages**: Increases in unreported illness and late diagnoses, severe pressure on staff, disruption of treatment especially in low priority areas
- **Responses to Shortages**: Treatment priorities, queuing, waiting lists, substitutions of inputs
- Substantial increases in **Excess Mortality** and declines in **Life Expectancy**

Impacts of Covid-19 on Morbidity Iceberg



Intra-sectoral Priorities in Health Systems During Covid-19 Epidemics

Row	Indicators of Priority Status in Health Systems	High priority: Anti-Covid-19 institutions and programmes and urgent medical care	Low priority: Normal preventive health measures and medical treatments
Summary of evidence concerning indicators			
During Plan/Budget Formulation			
A	Health in leadership's objective function (OF)	Anti-Covid-19 health programmes have had high national priority. Urgent normal medical care also has been important. However, within some elderly Covid patients have been given lower priority in intensive care treatment.	Leadership accepts needs for trade-offs in health system between anti-Covid/urgent and less acute medical challenges. Low priority given to the usual non-communicable diseases, routine medical needs, and non-Covid preventive care.
B	Resource allocation responsiveness to problems	Government and NHS leaders react quickly to Covid-related problems and allocate resources to solve them.	Slow responses to usual health problems and limited resource allocations.
C	Wage rates and work conditions	In UK no special wage supplements or bonuses for those working on Covid 'front line', as in Russia, but energetic efforts made to improve work conditions (e.g. more PPE).	No changes in wages in routine medical care. It is treated as a residual claimant on scarce resources (e.g. PPE).
D	Adequacy of financial norms in budgets	Little advance budgeting, but governments commit to making sufficient finance available to support anti-Covid activities.	Budgets tighten for many are suspended
During Plan/Budget Implementation			
E	Output plans	Strong commitment to ensure fulfilment of plans for outputs related to anti-Covid fight: medical services, medicines, PPE, medical equipment, test kits, vaccines.	Minimal efforts made to usual medical activities.
F	Budget constraints	Soft budget constraints for activities engaged in anti-Covid fight (medical care, ICUs and ventilators, supplies, tests).	Budgets are reduced and constraints become harder (more binding).
G	Supply plans	Strong commitment to improve supplies to anti-Covid activities of necessary products (medicines, PPE, testing kits, ventilators).	Tolerance of under-normal medical activities to support
H	Siphoning of supplies	Covid-19 programmes protected against external siphoning and benefit from siphoning from less important programmes within NHS.	Resources (personnel, equipment, PPE, medicines) siphoned away from usual medical activities to support Covid-19 fight.
I	Investment plans	Government launches crash programmes to connect hospitals (e.g. Nightingale, Kommanurka) and to support production by medical industry and R&D related to Covid-19.	Most investment programmes frozen.
J	Inventories of inputs	Government and NHS leaders support the build-up of inventories needed for fight against Covid-19 (First and Second Wave).	Limited replacement of items used or siphoned away during First Wave.
K	Reserve production capacity	Reserve production exhausted during First Wave of Covid, but new programmes support its development for the future.	Tolerance of minimum actions to reduce them.
L	Shortage intensity	High intensity of shortages of anti-Covid products in March-April, but reduced in May-June due to better supplies. Staff shortages remain intense.	Higher intensity of shortages throughout First Wave and few actions to reduce them.
During Plan/Budget Formulation			
Row	Indicators of Priority Status in Health Systems	High priority: Anti-Covid-19 institutions and programmes and urgent medical care	Low priority: Normal preventive health measures and medical treatments
Summary of evidence concerning indicators			
During Plan/Budget Formulation			
A	Health in leadership's objective function (OF)	Anti-Covid-19 health programmes have had high national priority. Urgent normal medical care also has been important. However, within some elderly Covid patients have been given lower priority in intensive care treatment.	Leadership accepts needs for trade-offs in health system between anti-Covid/urgent and less acute medical challenges. Low priority given to the usual non-communicable diseases, routine medical needs, and non-Covid preventive care.
B	Resource allocation responsiveness to problems	Government and NHS leaders react quickly to Covid-related problems and allocate resources to solve them.	Slow responses to usual health problems and limited resource allocations.
During Plan/Budget Implementation			
E	Output plans	Strong commitment to ensure fulfilment of plans for outputs related to anti-Covid fight: medical services, medicines, PPE, medical equipment, test kits, vaccines.	Minimal efforts made to protect outputs related to usual medical activities.
F	Budget constraints	Soft budget constraints for activities engaged in anti-Covid fight (medical care, ICUs and ventilators, supplies, tests).	Budgets are reduced and constraints become harder (more binding).
H	Siphoning of supplies	Covid-19 programmes protected against external siphoning and benefit from siphoning from less important programmes within NHS.	Resources (personnel, equipment, PPE, medicines) siphoned away from usual medical activities to support Covid-19 fight.
J	Inventories of inputs	Government and NHS leaders support the build-up of inventories needed for fight against Covid-19 (First and Second Wave).	Limited replacement of items used or siphoned away during First Wave.
L	Shortage intensity	High intensity of shortages of anti-Covid products in March-April, but reduced in May-June due to better supplies. Staff shortages remain intense.	Higher intensity of shortages throughout First Wave and few actions to reduce them.

Shortages in the UK and Russia Health Systems during the First Wave of Covid-19

Row	Category	UK	Russia
A	Doctors: National shortages	Low provision of doctors by EU standards. Shortages of GPs and hospital doctors (compared to positions). Deficits related to Covid-19 covered by re-allocations from low priority branches. Supply reduced by illnesses and self-isolation.	High provision of doctors, but shortages of polyclinic and hospital doctors compared to established positions. Deficits related to Covid-19 covered by re-allocations from low priority branches. Supply reduced by illnesses and self-isolation.
B	Doctors: Shortages in rural areas and deprived regions	Availability of GPs and hospital doctors remained lower than in large cities. Occasional acute shortages arose in areas with high infection rates.	Continuation of significant shortages in the countryside and poorer regions. Few essential interventions because of general personnel problems in a national crisis.
C	Doctors: Shortages of specialists	Initial localised shortages of fully-trained specialists in respiratory illnesses, acute care and anaesthetics. Shortages reduced by mobilisation and re-training, but increased by illnesses and self-isolation.	Doctor shortages in respiratory illness, acute care and anaesthetics relative to rising Covid-19 demands. Shortages reduced by mobilisation and re-training, but increased by illnesses and self-isolation.
D	Middle Medical Personnel (MMP): National shortages	Low provision of MMP by EU standards and many vacant positions. Deficits reduced by mobilisation and re-training, but increased by illnesses and exits.	Many MMP by EU standards, but poor work conditions and low wages reduced morale. Low ratio of MMPs to doctors.
E	MMP: Shortages in rural areas and deprived regions	Significant shortages of nurses and technical personnel. Problems slightly mitigated by adjusting coverage standards (e.g. more patients per nurse) and substitutions.	Inadequate provision of MMPs in the countryside and some regions. Shortages intensified, in part by shifting from backward areas to big cities.
F	MMP: Shortages of specialists	Serious shortages of fully-trained nurses in acute care as well as technicians to operate ventilators and other capital equipment. Deficits reduced by training of staff.	Shortages of MMPs with technical skills, notably in acute care involving use of ventilators, CT scanners and dialysis machines.
G	Shortages of hospital facilities and beds	NHS had low bed and ICU provision by EU standards. NHS discharged 30000 patients, increased ICU capacity, and built <i>Nightingale</i> hospitals. Only local ICU shortages related to Covid-19 due to rationing, but increased deficits in low priority medical programmes.	Shortages of modern hospitals with well-equipped ICUs. Many facilities in rural areas and backward regions had substantial inadequacies. Emergency reallocations of resources helped reduced shortages related to Covid-19.
H	Shortages of medicines and medical inputs	Rising demands resulted in general and localised shortages of painkillers, sedatives, blood pressure drugs, anaesthetics and medical supplies. Widespread shortages of PPE in NHS and social care.	Inherited shortages of effective medicines intensified during March-May. Difficulties in importing deficit goods and to intensifying import-substitution production. Severe shortages of PPE.
I	Shortages of testing for Covid-19	Supply of Tier 1 and Tier 2 tests rose from negligible in January to 43,109 daily by late June. Demand was controlled by rationing, so limited open evidence of shortages. But severe deficits existed relative to need.	Early rapid expansion of testing to a relatively high level by end of June. Limited public complaints about shortages of tests, but severe deficits existed relative to need.
J	Shortages of medical equipment	NHS had only 5,000 ventilators in February, but these were re-allocated to treat Covid patients, so shortages did not develop before supply increased to 8,000. UK had low provision of CT scanners and dialysis machines and shortages intensified as Covid demands increased. Shortages in low priority medical programmes intensified.	NHS had sufficient number of ventilators (40,000) (of variable quality) in February and supply increased. CT scanners and dialysis machines were reallocated to the 'front line', but severe shortages developed in some facilities, especially in rural areas and backward regions. Staff shortages constrained the use of some equipment.

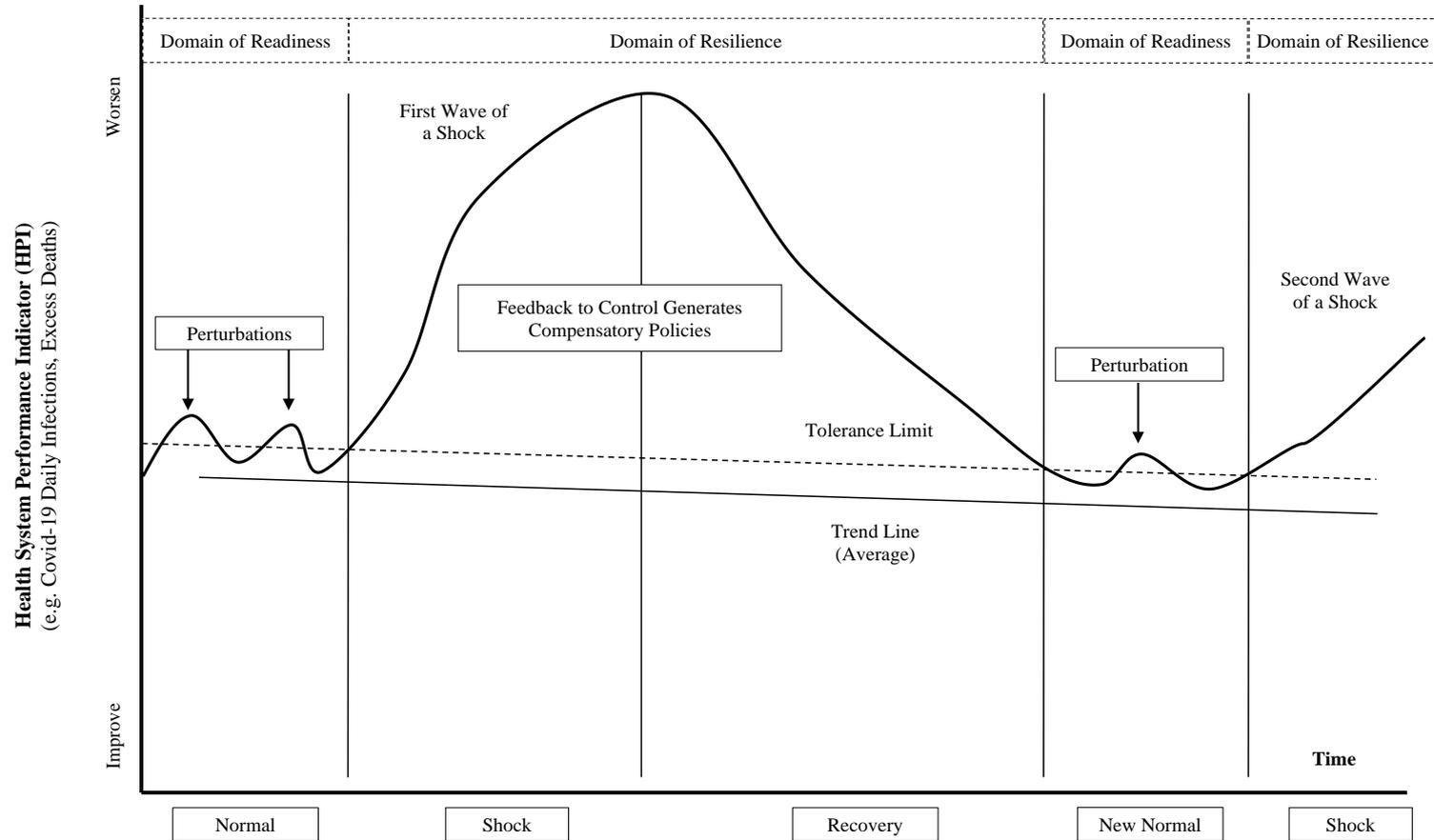
Row	Category	UK	Russia
A	Doctors: National shortages	Low provision of doctors by EU standards. Shortages of GPs and hospital doctors compared to positions. Deficits related to Covid-19 covered by re-allocations from low priority branches. Supply reduced by illnesses and self-isolation.	High provision of doctors, but shortages of polyclinic and hospital doctors compared to established positions. Deficits related to Covid-19 covered by re-allocations from low priority branches. Supply reduced by illnesses and self-isolation.
C	Doctors: Shortages of specialists	Initial localised shortages of fully-trained specialists in respiratory illnesses, acute care and anaesthetics. Shortages reduced by mobilisation and re-training, but increased by illnesses and self-isolation.	Doctor shortages in respiratory illness, acute care and anaesthetics relative to rising Covid-19 demands. Shortages reduced by mobilisation and re-training, but increased by illnesses and self-isolation.
D	Middle Medical Personnel (MMP): National shortages	Low provision of MMP by EU standards and many vacant positions. Deficits reduced by mobilisation and re-training, but increased by illnesses and exits.	Many MMP by EU standards, but poor work conditions and low wages reduced morale. Low ratio of MMPs to doctors.
F	MMP: Shortages of specialists	Serious shortages of fully-trained nurses in acute care as well as technicians to operate ventilators and other capital equipment. Deficits reduced by training of staff.	Shortages of MMPs with technical skills, notably in acute care involving use of ventilators, CT scanners and dialysis machines.
G	Shortages of hospital facilities and beds	NHS had low bed and ICU provision by EU standards. NHS discharged 30,000 patients, increased ICU capacity, and built <i>Nightingale</i> hospitals. Only local ICU shortages related to Covid-19 due to rationing, but increased deficits in low priority medical programmes.	Shortages of modern hospitals with well-equipped ICUs. Many facilities in rural areas and backward regions had substantial inadequacies. Emergency reallocations of resources helped reduced shortages related to Covid-19.
H	Shortages of medicines and medical inputs	Rising demands resulted in general and localised shortages of: painkillers, sedatives, blood pressure drugs, anaesthetics and medical supplies. Widespread shortages of PPE in NHS and social care.	Inherited shortages of effective medicines intensified during March-May. Difficulties in importing deficit goods and to intensifying import-substitution production. Severe shortages of PPE.
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Consequences of Shortages in the UK and Russia Health Systems and Policy Responses: First Wave

Row	Category	UK	Russia
Consequences of shortages			
A	Shortages cause bottlenecks in the production of medical services	Personnel lack of ICU nurses caused cancelled emergency care admissions; high illness rates & self-isolation of staff disrupted hospital teams. Equipment: lack of dialysis machines impeded treatment. Medicines and supplies: deficits caused disruptions to provision of medical care.	
B	Shortages increase stress and lower motivation of medical personnel	Covid hospital treatment was stressful due not only to complexity and lethality of disease and risk to staff of infectiousness, but also to shortages of PPE, tests for Covid, medicines, and equipment. Stress was augmented by complaints from patients concerning insufficiency of non-Covid medical services. Attempts were made to keep up morale of NHS staff: weekly clap by the public in the UK and cash bonuses for front-line workers in Russia.	
C	Shortages cause citizens to under-report illnesses, thereby increasing the hidden components of morbidity icebergs	Patients avoided GPs and A&E departments due to fear of infection and cut-backs in NHS services. GPs discouraged personal meetings, A&E adopted firmer triage rules and hospitals reduced normal treatments. So, more illnesses were not reported and hidden component of morbidity iceberg increased.	Patients increasingly avoided visiting polyclinics due to deficiencies in facilities, fear of infection, and reductions in normal services. Outpatient doctors made fewer referrals to hospitals, which limited non-Covid treatments. As a result, more illnesses were not reported.
Policy responses to shortages			
D	Adjustments of medical priorities and constraints on non-Covid medical care	See Table 2. Highest priority: Covid-19 patients and emergency cases of other illnesses. Medium priority: cancer and other serious illnesses. Low priority: some frail elderly with Covid, routine illnesses, and elective surgery.	See Table 2. Highest priority: Covid-19, emergency, and cancer patients (National Project in Cancer). Medium priority: cardiovascular and other serious illnesses. Low priority: routine illnesses and elective surgery.
E	Rationing through subsystems of medical care	There was no rigid rationing through subsystems, but there was unevenness of capacities to treat Covid-19 across four 'zones': large cities and counties. Most patients were treated in local facilities. Few hospitalized 80+ elderly Covid patients received intensive care.	
F	Rationing by queuing	Physical queues at GP offices were replaced by triage by telephone to set up personal meetings with a doctor. A&E visits dropped by 27%, but the number of waits beyond 4 hours fell by 50%.	
G	Rationing by waiting lists	Most under-60 Covid patients in hospitals were treated fully on an urgent basis, whereas few elderly 80+ received intensive care. Waiting lists and waiting times increased for treatments of non-communicable diseases (cancer, cardiovascular).	
H	Temporary elimination of medical services in the NHS	In responses to the rising risk of infections and realistic treatment of Covid cases, many standard screening of temporarily suspended or severely reduced to curtail the growth of hidden illness and waiting lists.	
I	Substitution of traditional inputs by cheaper or less effective ones	During the peak periods of the epidemics, there were shortages. Personnel fully trained ICU staff members. Medicines: less effective drugs replaced recommended machines and treatment procedures (e.g. intermittent PPE was replaced by less effective alternatives).	

Row	Category	UK	Russia
Consequences of shortages			
A	Shortages cause bottlenecks in the production of medical services	Personnel: lack of ICU nurses caused cancelled emergency care admissions; high illness rates & self-isolation of staff disrupted hospital teams. Equipment: lack of dialysis machines impeded treatment. Medicines and supplies: deficits caused disruptions to provision of medical care.	
C	Shortages cause citizens to under-report illnesses, thereby increasing the hidden components of morbidity icebergs	Patients avoided GPs and A&E departments due to fear of infection and cut-backs in NHS services. GPs discouraged personal meetings, A&E adopted firmer triage rules and hospitals reduced normal treatments. So, more illnesses were not reported and hidden component of morbidity iceberg increased.	Patients increasingly avoided visiting polyclinics due to deficiencies in facilities, fear of infection, and reductions in normal services. Outpatient doctors made fewer referrals to hospitals, which limited non-Covid treatments. As a result, more illnesses were not reported.
Policy responses to shortages			
D	Adjustments of medical priorities and constraints on non-Covid medical care	See Table 2. Highest priority: Covid-19 patients and emergency cases of other illnesses. Medium priority: cancer and other serious illnesses; Low priority: some frail elderly with Covid, routine illnesses, and elective surgery.	See Table 2. Highest priority: Covid-19, emergency, and cancer patients (National Project in Cancer). Medium priority: cardiovascular and other serious illnesses. Low priority: routine illnesses and elective surgery.
F	Rationing by queuing	Physical queues at GP offices were replaced by triage by telephone to set up personal meetings with a doctor. A&E visits dropped by 27%, but the number of waits beyond 4 hours fell by 50%.	There were decreases in patient queuing at polyclinics due to reductions in visits by fearful ill people and to supply restrictions (high priority to Covid-19).
G	Rationing by waiting lists	Most under-60 Covid patients in hospitals were treated fully on an urgent basis, whereas few elderly 80+ received intensive care. Waiting lists and waiting times increased for treatments of non-communicable diseases (cancer, cardiovascular).	Covid and cancer patients treated on an urgent basis. Waiting lists and waiting times increased for treatments of non-Covid illnesses, but cardiovascular patients had higher priority among them.

Readiness and Resilience of Health Systems Experiencing Shocks (Covid-19)



Phases of Complex Health System Development in Periods of Shocks

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Ratings of Resilience of the UK and Russia Health Systems During Covid-19 Epidemics

Category of Resilience	UK				Russia			
	First Wave		Second Wave		First Wave		Second Wave	
	Rating	Points	Rating	Points	Rating	Points	Rating	Points
A: Control of the health system: Adaptations of health management and priorities.	<i>Substandard.</i>	2	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3
B: Mobilisation and management of medical personnel.	<i>Average.</i>	3	<i>Average.</i>	3	<i>Good.</i>	4	<i>Good.</i>	4
C: Mobilisation of medical facilities, medical equipment and ICUs.	<i>Average.</i>	3	<i>Good.</i>	4	<i>Average.</i>	3	<i>Average.</i>	3
D: Adaptation of the medical supply system and its effectiveness.	<i>Poor.</i>	1	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3
E: Acquisition and distribution of new medical capital equipment.	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3
F: Acquisition and distribution of medicines and medical supplies.	<i>Substandard.</i>	2	<i>Average.</i>	3	<i>Substandard.</i>	2	<i>Average.</i>	3
G: Acquisition and distribution of medical personal protective equipment (PPE).	<i>Poor.</i>	1	<i>Average.</i>	3	<i>Poor.</i>	1	<i>Substandard.</i>	2
H: Adequacy of treatment of medical needs of the population (morbidity iceberg including hidden illness).	<i>Substandard.</i>	2	<i>Substandard.</i>	2	<i>Substandard.</i>	2	<i>Substandard.</i>	2
I: Adequacy of treatment of medical demands (reported illness) of the population (scale of rationing through waiting lists).	<i>Substandard.</i>	2	<i>Substandard.</i>	2	<i>Substandard.</i>	2	<i>Substandard.</i>	2
J: Mobilisation of domestic industry production of medicines, medical goods, medical PPE and medical equipment.	<i>Good.</i>	4	<i>Good.</i>	4	<i>Good.</i>	4	<i>Good.</i>	4
K: Mobilisation of domestic biomedical R&D for the development of Covid-19 tests and vaccines and for laboratory processing of tests.	<i>Good.</i>	4	<i>Good.</i>	4	<i>Good.</i>	4	<i>Good.</i>	4
L: Mobilisation of field testing for Covid-19 and tracing contacts of infected people.	<i>Poor.</i>	1	<i>Substandard.</i>	2	<i>Substandard.</i>	2	<i>Average.</i>	3
M: Medical system performance during the Covid-19 epidemic	<i>Average.</i>	3	<i>Good.</i>	4	<i>Average.</i>	3	<i>Average.</i>	3
N: Health outcomes (Remain Healthy, Illness, Recovery, Mortality).	<i>Substandard.</i>	2	<i>Substandard.</i>	2	<i>Average.</i>	3	<i>Substandard.</i>	2
O: Mobilisation of residential social care homes to protect vulnerable people.	<i>Poor.</i>	1	<i>Average.</i>	3	<i>Average.</i>	3	<i>Average.</i>	3
P: Overall assessment of the resilience of the national health system.	<i>Substandard.</i>	2.3	<i>Average.</i>	3.0	<i>Average.</i>	2.8	<i>Average.</i>	2.9

Lessons from Covid-19 Experiences for Health Systems: 1

- Interconnections not only between subsystems within health systems, but also between five complex systems (politics, society, economy, health, social care)
- Failures of forecasting morbidity developments resulted in incorrect investment in medical technologies and capital stock by 2020
- Shortages and neglect of middle medical personnel (nurses) undermine medical treatment
- Under-development of residential social care put elderly residents at risk and created bottlenecks in hospitals

Lessons from Covid-19 Experiences for Health Systems: 2

- Inadequacies in medical supply systems. Insufficient inventories of PPE, equipment and medicines in the Covid-19 period. Over-reliance on certain countries, such as China for PPE and India for vaccines.
- Neglect of maintaining national capabilities in science and technological innovation (e.g. vaccines) and production capabilities.