## Online Appendix 1. Thailand pharmacy workforce landscape

# SUPPLY SIDE



# PHARMACY EDUCATION SYSTEM

# Provision of 6-year PharmD Program

- 19 pharmacy schools (14 public & 5 private), accredited by the Pharmacy Council of Thailand (PCT)
- 3 specialty tracks (number of school provided):
  - Pharmaceutical care (19)
  - Industrial pharmacy (14)
  - Pharmaceutical & health consumer protection (2)
- Minimum requirement of total 220 credits for 3 subject domains: general education, basic sciences and pharmacy profession, elective
- Yr. 1-3 for developing general competencies (minimum credit):
  - General education (30)
  - Basic sciences (30)
  - Pharmaceutical products (30 or 25% of professional credit)
  - Patient care (30 or 25% of professional credit)
  - Social and administrative pharmacy (15 or 12%)
  - Senior project (3), Free electives (6)
  - Introductory pharmacy practice experience (6):
    - 200 hr. in community pharmacy
    - 200 hr. in district hospital

### Yr. 4-6 for developing specialized competencies (minimum credit):

- Courses for specialty track (15)
- Advanced pharmacy practice experience (28):
   1,600 hr. of 6-7 clerkships for compulsory and elective clerkships



# Pharmacy licensure examination (PLE)

- PLE-Core competency (general competencies) (Yr. 4)
- PLE for specialty track (Yr. 6)
  - Pharmaceutical care
  - Industrial pharmacy
  - Pharmaceutical and health consumer protection

# Professional development

- Relicensing every 5 years: 100 continuing pharmaceutical education (CPE) credits required; minimum 10/yr.
- Master degree and PhD programs
- Residency programs & short-term training courses by colleges under the PCT
  - College of Pharmacotherapy of Thailand (C.Ph.T.)
  - College of Pharmaceutical and Health Consumer Protection of Thailand (CPHCP)
  - College of Herbal Pharmacy of Thailand (C.H.P.T.)
  - In the process of establishing: College of Industrial Pharmacy, College of Pharmacy Administration

Population need

Demand for pharmacist from health system

### DEMAND SIDE



### Practice sites and services

# Health care sector

- Hospital
  - Pharmaceutical care
  - Inventory management
  - Drug information service
  - Drug system
  - management
  - Primary health care and Pharmaceutical & health consumer protection
- · Community pharmacy

#### Other sectors

- Pharmaceutical industry
  - Research & development
  - Production
  - Quality control
  - Quality assurance
  - Regulatory affairsClinical research
  - Procurement & logistics
  - Marketing and vigilance
- Registration & regulationDrug management
- Academia

### COMPETENCY STANDARDS BY THE PHARMACY COUNCIL OF THAILAND

# SPECIALIZED COMPETENCIES

## Pharmaceutical care

- Integration of pharmaceutical science knowledge into practice
- 2) Drug selection
- Extemporaneous preparation
- Extemporaneous p
   Health promotion
- 5) Laws and regulations
- Pharmaceutical care
- 7) Drug system management for patient safety
- 8) Quality assurance
- Drug information service

# Industrial pharmacy

- 1) Research & development
- Quality assurance & quality control
- 3) Manufacture
- 4) Regulatory affairs

# Pharmaceutical and health consumer protection

- 1) Laws & enforcement
- Risk management, epidemiology and drug safety
- Public health pharmacy for consumer protection
- Policy and drug management

# GENERAL COMPETENCIES

- Profession and ethics
- Teamwork and system management
- 3) Information and communication
- Pharmaceutical and herbal products, quality control
- 5) Drug procurement and extemporaneous preparation
- 6) Pharmaceutical care and use of herbal medicines
- 7) Health and public health systems



# Online Appendix 2. Scenario of desirable Thai health systems in 2026

#### Factors affecting Desirable health systems health systems Society Philosophy of Goals of 1. Changes in population health systems healthcare system "Health systems" = total relationships of 1. Health = fundamental rights demographics sub-systems related to health 1. Quality, 2. Responsible citizen Standard & safety, 3. Health in all policies Service delivery Continuity 4. Health system that is based 2. Communicable Health workforce 2. Equity on: morality, ethics, Medical products & diseases & 3. Efficiency humanitarian, governance, technologies Emerging Social accountability knowledge & wisdom, Financing diseases 5. Sustainability human dignity, context-Information Leadership & relevance, holistic, sustainability, and governance 3. Globalization & international participation trade Characteristics of 4. New technology desirable health systems 8. District health systems: 5. Economic B Long Seamless & provincial health service term network, referral hospital cascade changes care 9. Quality & safety of health services: 6. Urbanization 4. Crisis response Clinical practice guideline, quality assurance, evidence-based practice Emergency medicine Disaster 7. Policy reform $\mathcal{L}$ 10. Drug and technology management security: Access to medicines and health resources within 3. Strengthen gatekeeper: 3. Strengthen gatekeep Centralized IP & satellite OP 8. Health systems benefit scheme, strengthen reform **(** domestic (pharmaceutical, 2. Primary health care: biologics, herbal medicines) Continuity & seamless care, industry for self-reliance 9. Decentralization health promotion & prevention 11. Public-private 1. Self-care: Health literacy, access to health information partnership

